AN OVERVIEW OF 2013 ACTIVITIES IN THE LOUISIANA STATE UNIVERSITY AGRICULTURAL CENTER SUGARCANE VARIETY DEVELOPMENT PROGRAM

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The Louisiana State University Agricultural Center (LSU AgCenter) Sugarcane Variety Development Program contributes to the profitability of the Louisiana sugar industry be developing new genetically improved sugarcane varieties. This is accomplished through multidisciplinary research among a team of scientists drawn from a diversity of disciplines within the LSU AgCenter (Table 1) as well as from other organizations such as the United States Department of Agriculture (USDA) and the American Sugar Cane League. The LSU AgCenter and the United States Department of Agriculture (USDA) sugarcane variety development teams work independently as well as cooperatively to produce "L" and HoCP or Ho varieties, respectively. The best varieties from each program are brought together for evaluation at the nursery, infield, and outfield testing stages of the program (Table 2). Outfield testing is conducted by personnel from the LSU AgCenter, the USDA, and the American Sugar Cane League. Upon recommending a variety for commercial release, seed increase is carried out by the American Sugar Cane League and generally commences when varieties are introduced to the outfield testing stage. The cooperative effort under which the three entities (the LSU AgCenter, the USDA, and the American Sugar Cane League) participate to develop improved sugarcane varieties for the Louisiana sugarcane industry is outlined in the "Three-Way Agreement of 2007".

Table 1. Members of the LSU AgCenter Sugarcane Variety Development Team in 2013.

Team Member	Budgetary Unit	Responsibility
Collins Kimbeng	Sugar Res. Station	Program Leader
Michael Pontif	Sugar Res. Station	Crossing, Selection and Variety Testing
Sonny Viator	Iberia Research Station	Variety Testing
Niranjan Baisakh	School of Plant, Soil and Environmental Sciences	Molecular Breeding
Gene Reagan	Entomology	Insect Resistance
Jeff Hoy	Plant Pathology	Disease Resistance
Jim Griffin	Plant, Env. & Soil Sci.	Herbicide Tolerance
Brenda Tubana	Plant, Env. & Soil Sci.	Agronomy
Gert Hawkins	Sugar Res. Station	Sucrose Laboratory
Alphonse Coco	Sugar Res. Station	Photoperiod & Crossing
David Sexton	Sugar Res. Station	Outfield
Todd Robert	Sugar Res. Station	Farm Crew
Joel Hebert	Sugar Res. Station	Farm Manager

Success in developing improved sugarcane varieties is heavily dependent on the availability of novel genetic variation created through targeted cross hybridization. Cultivated sugarcane does not flower naturally in Louisiana because of the cool fall temperatures hence, the

breeding program must rely on artificial photoperiod treatment to induce and synchronize flowering of sugarcane parents for crossing. Photoperiod treatment to induce flowering began on May 30 and continued until September 12, 2013. Crossing lasted from September 3 to November 3, 2013. A total of 755 tassels of 102 clones were used to make 529 crosses. The number of viable seeds per cross was estimated by counting the number of shoots produced per 0.5 g of seed (fuzz). A total of 110,953 seed were produced from bi-parental crosses, and 31,152 seed were produced from polycrosses. Check the section titled "**2013 PHOTOPERIOD AND CROSSING IN THE LSU AGCENTER SUGARCANE VARIETY DEVELOPMENT PROGRAM**" for details of the 2013 crossing campaign.

Seeds (fuzz) were germinated in the green house in 25 l x 15 w x 4 h inches metal trays filled with 2 inches of potting mix in January of 2013. Individual seedlings were transplanted into styrofoam trays with 128 (1.5 l x 1.5 w x 1.5 h inches per cell) cells in early March of 2013. A total of 78,747 seedlings from 170 crosses most of them from the 2012 crossing campaign were transplanted to the field in April of 2013. Many of these seedlings were progeny of biparental crosses among commercial as well as superior experimental varieties. In addition, seedlings were planted in a cross appraisal trial. Individual seedling selection will be carried out in 2014 when these seedlings are in the first stubble crop.

Individual seedling selection was practiced on 45,543 first stubble single stools in the fall of 2013. These seedlings were mostly from the 2010 crossing series that were planted to the field in 2011, were in the plant cane crop in 2012 and first ratoon cane crop in 2013. Unlike in 2012 where the seedlings were severely lodged following Hurricane Isaac, the seedlings were mostly erect during selection which made for easier selection environment. Selection was conducted in October when the mills opened and were ready to process cane. Each row was selected and then harvested using a combined harvester to expose the next row. Half way through the selection process we had to resort to selecting without harvesting the cane as the mill average for sucrose from the seedlings was poor. Family selection, based on accumulated data from family appraisal studies and visual assessment of seedling populations, was used to discard about ten percent of families prior to selection. The selection criteria included visual appraisal of individual seedlings for disease and insect damage, lodging, pith and yield (stalk number, stalk diameter and height). This was followed by evaluation of the visually selected clones for Brix using a hand held refractometer. A total of 1,985 clones (4 % selection rate) were selected and planted in 10-foot, First Line trial plots.

The First Line trial plots established the year before (2010 crossing series) were evaluated and superior clones selected and planted into a second line trial. Breeders walked through the plots and dropped clones based on visual appraisal for diseases, insect damage and, poor or weak stands. Clones that were not dropped the first time around were evaluated for pith, and Brix. A total of 484 clones (17.9 % selection rate) were eventually selected and planted into single row, 16-foot Second Line trial. From the Second Line trial established the year before (2009 crossing series) 190 clones were selected and planted into 2-row, unreplicated, 16-foot increase plots. These are tentative selections with the 'seed cane' being increased pending data from the ratoon crop. By the time clones are assigned a permanent 'L' number using both the plant and first ratoon cane crop data there will be enough material to plant replicated trials in

three On Station Nurseries. Preliminary visual ratings for cane yield and plant type were done in August on the 393 Second Line clones from the 2008 crossing series. Clones with acceptable ratings were further evaluated for lodging and/or broken tops, borer damage, disease symptoms, pith, and Brix/sugar per ton. A total of 30 experimental varieties judged to be superior to the checks were assigned permanent variety designations ("L") in the fall of 2013 (Table 2). These newly assigned experimental varieties were entered into replicated On Station Nursery trials (2 replicates, 16-foot plots) at three locations (Sugar Research Station, Iberia Research Station and USDA-ARS Ardoyne Farm). Details can be found in the section titled "**SELECTIONS, ADVANCEMENTS, AND ASSIGNMENTS OF THE LSU AGCENTER'S SUGARCANE VARIETY DEVELOPMENT PROGRAM FOR 2013**".

Eleven experimental varieties from the 2012 Assignment series that performed well in the plant cane crop On Station Nursery trials were replanted in Infield and Off Station nursery tests (Table 2). Five varieties (L 11-168, L 11- 172, L 11-183, L 11- 187 and L 11-191) that performed well in the Infield and Off Station nurseries (plant cane crops) and On Station nurseries (first ratoon cane crops) tests were introduced to Outfield locations as increase plots. Those that continue to perform well in these tests will subsequently be planted into the Outfield testing stage of the program in 2014. One variety (L 10 -147) was taken from the Outfield increase plots and planted into the Outfield tests in 2013. Varieties from the 2007, 2008 and 2009 Assignment series that failed to perform better than the commercial checks have all been dropped from the program. Details can be found in section titled **"2013 LOUISIANA SUGARCANE VARIETY DEVELOPMENT PROGRAM NURSERY AND INFIELD VARIETY TRIALS".**

Unlike the 2012 season, there was not a high incidence of rust, caused by *Puccinia melanocephalacan,* on the station. There was no need to rate trials specifically for incidence of rust infection. Other diseases also had a minimal effect on the selection process. For example, only 0.60 % of clones were dropped for susceptibility to smut from the First Line trial compared to 1.5 % in 2012. It was not necessary to spray the crop on the station to prevent borer damage as very little incidences of borer damage were reported.

In general the 2013 sugarcane crop experienced a normal range of growing conditions although earlier on in the spring it was cooler than normal. The planting season had average rainfall and all experiments were planted in a timely manner. The crop did experience a freeze in late November 2013. Although there were several experiments harvested after the freeze they were not badly affected by the freeze because temperatures remained cool. Unlike in the 2012 season, there was no tropical storm so lodging was not a big problem and it was easy to identify clones that were naturally prone to lodging. Planting and harvesting of all experimental varieties proceeded as planned. Breeding personnel also assisted Dr. Jeff Hoy (Plant Pathologist) and Dr. Gene Reagan (Entomologist) to enter new experimental varieties in the sugarcane smut and Leaf Scald and sugarcane borer resistance tests, respectively.

The decision regarding further testing and seed increase of candidate varieties in the program was determined at the Variety Advancement Committee meeting. The 2013 meeting was held on Friday August 16, 2013 at the American Sugar Cane League office in Thibodaux, Louisiana.

Progress in the LSU AgCenter Sugarcane Variety Development Program would not be possible without the financial support of state funds through the LSU AgCenter and the Louisiana sugar industry through the American Sugar Cane League and the cooperation of personnel from the American Sugar Cane League and the USDA-ARS Sugarcane Research Unit.

Table 2. Number of "L" varieties by assignment series for each stage of testing in 2013.

Assignment Series	Stage of Testing	Number of experimental varieties
L 2007	Outfield – Replanted and harvested as plantcane, first stubble, and second stubble	0
L 2008	Outfield – Replanted and harvested as plantcane and first stubble Off-station nurseries and infield – 3rd stubble harvested	0
L 2009	Outfield – Replanted and harvested as plantcane On-station nurseries - 3rd stubble harvested Off-station nurseries and infield – 2nd stubble harvested.	1
L 2010	Outfield – Planted On-station nurseries - 2nd stubble harvested Off-station nurseries and infield - 1st stubble harvested	1
L 2011	Outfield – Introduced On-station nurseries - 1st stubble harvested Off-station nurseries and infield - plantcane harvested.	5
L 2012	On-station nurseries - plantcane harvested Off-station nurseries and infield planted	11
L 2013	Assignment On-station nurseries planted	30

2013 PHOTOPERIOD AND CROSSING IN THE LSU AGCENTER SUGARCANE VARIETY DEVELOPMENT PROGRAM

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Photoperiod and crossing are the first stages in the LSU Agcenter's Sugarcane Variety Development Program. For the release of new varieties to be productive, success must first be achieved at photoperiod and crossing. Proper photoperiod induction in addition to proper hybridization techniques are key factors for the production of viable seed belonging to viable crosses. Viable crosses are the optimum and most desirable combinations that will be advanced to the seedling stage of the Sugarcane Variety Development Program. In order to accomplish viable crosses, the seed must be viable or alive to produce adequate germination. This seed will then be advanced to the seedling stage of the Sugarcane Variety Development Program.

Cuttings of potential parent varieties used for the 2013 crossing season were planted in the fall of 2012. After establishing the plants from the cuttings, the plants were fertilized biweekly with a 400 ppm solution of Peter's 20-20-20. In late January 2013, the cuttings were then transferred to can culture. In April, the cans were moved from the greenhouse to the photoperiod rail carts. Soluble fertilizer applications were continued on a biweekly basis. Fertilization was discontinued in early- to mid-May to condition the plants for floral induction. Two additional applications of dry granular fertilizer (8-24-24, one Tbs/can) were applied to the cans during July and August. A reduced nitrogen ratio makes a higher C:N ratio, which is more desirable for the ease of flowering.

Natural lighting and six light-tight chambers were used for photoperiod treatments. To prevent overwhelming the crossing facilities, two flowering peaks were planned for September 23 and October 8 although these two flowering peaks can be advanced or delayed because of certain climatic factors. Records of varietal flowering, past photoperiod response, and pollen production were used to determine the most appropriate photoperiod treatment for each variety. The first photoperiod treatments began on May 30. All photoperiod treatments (time from artificial sunrise to natural sunset) were initiated with a minimum of 34 consecutive days of 12 ½ hours of constant day length. After the initial constant photoperiod days, day length was shortened by one minute per day. Treatments differed by the number of days with constant day length and the date on which the decline of photoperiod was initiated. All photoperiod treatments were discontinued on September 12, 2013, when natural day length was 12 ½ hours and decreasing.

Photoperiod treatments require pulling the carts out of the photoperiod bays at their appropriate time each morning to receive full sunlight. On certain days when the weather was severe, the carts were pushed back into the photoperiod chambers to protect the parental varieties from wind damage. The doors were partially opened to allow natural light to enter the chambers.

Flowering percentage of total stalks were average on the photoperiod carts in 2013 (Tables 1-2). Total flowering percentage for the six bays was 47%, which was comprised from 1,615 stalks of which 755 produce tassels. Although the flowering percentage was average in 2013, successful seed production is comprised of a multitude of factors. An adequate germination rate provided the Variety Development Program with sufficient seed production. In 2013 as in previous years, seedlings were produced from hybridization techniques that used sugarcane yield components, borer resistance, and disease resistance as some of the criteria to determine which breeding clones were most compatible.

Close attention was made once again to maintain high relative humidity within the crossing greenhouse; high relative humidity has been proven in past studies to increase seed set. High relative humidity is maintained with the use of a misting system that has been installed inside of the crossing greenhouse. High temperatures in the crossing house can also result in poor seed set as temperatures in excess of 95°F have adverse effects on pollen viability. Temperatures between 85-95°F were maintained in the greenhouse along with 85-98% relative humidity.

The flowering season in 2013 began during the first week of September. The normal time frame for first flowering can be as early as the last week of August or as late as the third week of September. There can be a slight deviation for first flower due to temperature during the photoperiod induction phase, varietal characteristics, and the photoperiod treatments. Crossing began on September 3 and ended on November 3, 2013. A total of 755 tassels of 102 clones were used to produce 529 crosses. Germination rate was estimated based on the germination of 0.5 g of seed that was germinated under greenhouse conditions in early December. A total of 145,326 viable seed were produced in 2013. A total of 110,953 seed were produced from bi-parental crosses, and 31,152 seed were produced from polycrosses (Table 3).

Table 1. Summary of the 2013 photoperiod treatments for the LSU AgCenter's sugarcane variety development program.

Bay	Cart	Treatment Start Date	Days of Constant Photoperiod	Date Photoperiod Decline Started	Days of Declining Photoperiod		Mean Flowering Date	Total Stalks	Percent Flowered
					Peak 1	Peak 2			
1	A	16-Jun	44	30-Jul	72	87	289±1	93	59
1	B	16-Jun	44	30-Jul	72	87	296±1	89	47
1	C	16-Jun	44	30-Jul	72	87	298±2	87	29
2	A	16-Jun	44	30-Jul	72	87	290±1	90	66
2	B	16-Jun	44	30-Jul	72	87	301±2	91	38
2	C	16-Jun	44	30-Jul	72	87	296±2	90	53
3	A	01-Jun	37	8-Jul	87	102	285±2	92	55
3	B	01-Jun	37	8-Jul	87	102	289±3	86	42
3	C	01-Jun	37	8-Jul	87	102	296±2	87	32
4	A	01-Jun	37	8-Jul	87	102	279±2	95	37
4	B	01-Jun	37	8-Jul	87	102	292±2	100	26
4	C	01-Jun	37	8-Jul	87	102	288±3	84	24
5	A	01-Jun	41	12-Jul	82	97	288±1	87	63
5	B	01-Jun	41	12-Jul	82	97	293±2	84	51
5	C	01-Jun	41	12-Jul	82	97	294±2	83	51
6	A	01-Jun	41	12-Jul	82	97	289±2	92	73
6	B	01-Jun	41	12-Jul	82	97	292±2	85	53
6	C	01-Jun	41	12-Jul	82	97	285±2	99	43

Table 2. Summary of can, variety, and flower information on bays 1-6 subjected to photoperiod treatments.

Varieties used in crossing	Cans with stalks	Cans with tassels	Total stalks	Total tassels	Mean stalks per can	Mean tassels per can†	Mean pollen rating‡	Mean days to flower§
----------Number----------								
130	324	227	1615	755	4.98±0.87	3.32±1.46	5.50±1.74	74.25±12.44

† Based upon cans with tassels.
‡ Rating of 1 to 4 being male and 5 to 9 being female.
§ Days from decline date to flowering.

Table 3. Summary of 2013 crossing and seed production.

Type of Cross	Crosses	Sum of Seed Production	Mean Seed Production Per Cross	Mean Seed Production Per Female Tassel	Mean Germination Per Gram Seed
----------Number----------					
Biparental	397	107093	270±630	270±630	19±34
Polycross	92	32500	328±568	328±568	23±33
Self	93	5732	174±403	174±403	13±21
Total	529	145325	274±607	274±607	19±33

Table 4. Varietal flowering summary in 2013 in the photoperiod bays.

Variety	Days of Constant Photoperiod	First Flower Date	Mean Days to Flower	Pollen Rating	Total Stalk Number	Total Flowers	Percent Flowering Stalks
CP83-644	40	277	89±2	7±1	31	3	10
HO06-530	41±1	284	99±6	7±1	15	2	13
HO06-563	40±1	252	69±1	6	15	11	73
HO07-613	42±1	275	84±2	6±1	20	5	25
HO07-617	39±1	263	81±9	7	9	2	22
HO08-709	43	270	83±3	7	12	7	58
HO08-711	39±1	303	.	.	11	1	9
HO08-717	41±1	268	87±5	5±1	16	5	31
HO09-840	42±1	249	64±3	6±1	14	10	71
HO10-912	37	.	.	.	6	.	.
HO10-927	37	.	.	.	6	.	.
HO10-937	42	268	81±3	6±1	11	3	27
HO11-506	44	.	.	.	5	.	.
HO11-508	37	.	.	.	4	.	.
HO11-509	44	.	.	.	5	.	.
HO11-510	44	275	69±4	6	6	6	100
HO11-512	43	275	91±7	8	10	2	20
HO11-515	44	287	79±1	5±1	5	5	100
HO11-517	44	277	80±5	6±1	5	4	80
HO11-526	37	.		.	6	.	.
HO11-528	37	256	75±3	6	6	3	50
HO11-529	37	259	72	7	10	1	10
HO11-532	41	263	75±1	4	4	4	100
HO11-556	37	249	63±1	5±1	5	5	100
HO11-561	44	.	88±4	7±1	4	.	.
HO11-571	44	.	.	.	6	.	.
HO11-572	44	.	.	.	5	.	.
HO11-573	43±1	263	92±12	6±2	10	3	30
HO95-988	40±1	261	72±7	7	14	4	29
HOCP00-950	41	254	73±2	7	43	32	74
HOCP01-517	41±1	263	80±3	7	24	10	42
HOCP01-523	40±1	268	87±7	4±1	15	3	20
HOCP02-618	40±1	268	98±7	6±1	22	6	27
HOCP04-838	42±1	249	65±2	4	26	19	73
HOCP04-847	40±1	261	83±4	7	25	8	32
HOCP05-902	38	268	77	8	16	1	6
HOCP09-800	44	305	94	6	5	1	20
HOCP09-804	42±1	273	86	7	17	1	6
HOCP09-814	40±1	280	95±3	7	19	4	21
HOCP10-900	44	275	71±3	6±1	5	4	80
HOCP10-901	44	.	.	.	5	.	.
HOCP10-917	44	.	.	.	5	.	.
HOCP11-504	44	263	53±1	5	5	5	100
HOCP11-516	44	280	78±5	6±1	5	3	60
HOCP11-533	31	254	63	7	5	1	20
HOCP11-536	41	280	89	4	6	1	17

Table 4. Continue

Variety	Days of Constant Photoperiod	First Flower Date	Mean Days To Flower	Pollen Rating	Total Stalk Number	Total Flowers	Percent Flowering Stalks
HOCP11-537	41	256	68±2	7	4	4	100
HOCP11-539	41	270	89±4	6±1	6	6	100
HOCP11-544	42	252	69±3	5	10	10	100
HOCP11-546	41	.	.	.	4	.	.
HOCP11-548	41	259	70±1	6	5	4	80
HOCP11-550	41	261	78±4	6	5	5	100
HOCP11-551	37	.	.	.	6	.	.
HOCP11-559	44	275	71±3	6±1	6	5	83
HOCP11-565	44	284	82±4	6±1	5	5	100
HOCP11-576	43±1	268	82±4	6±1	8	1	13
HOCP85-845	41±1	261	77±1	6	22	17	77
HOCP91-552	42±1	249	62±1	5	23	23	100
HOCP92-618	40	268	86±3	5	17	8	47
HOCP92-624	42±1	246	62±5	7	34	29	85
HOCP95-951	39±1	254	77±3	7	9	8	89
HOCP96-540	41	263	81±2	4	49	31	63
HOCP96-561	42±1	259	81±3	5	20	15	75
HOCP97-609	39±1	259	74±5	3	13	5	38
L01-283	41±1	273	92±4	6±1	31	7	23
L01-299	40	254	77±2	4	64	37	58
L05-448	41±1	252	71±2	4	10	6	60
L05-457	42	252	62±1	6	16	16	100
L06-001	41	252	76±2	5	37	17	46
L06-038	39±1	256	70±3	7	9	7	78
L06-040	41±1	261	78±3	7	19	13	68
L07-057	40±1	246	66±3	4	17	11	65
L08-088	39±1	.	.	.	10	.	.
L08-090	40±1	249	67±1	4	32	27	84
L09-099	39±1	249	80±7	7	22	7	32
L09-112	40±1	277	66	4	19	1	5
L09-117	39±1	.	.	.	16	.	.
L09-123	40±1	252	64±2	7	10	10	100
L09-131	40±1	.	94	8	8	.	.
L10-138	41	246	60±1	5±1	5	5	100
L10-141	37	.	.	.	6	.	.
L10-146	40±1	268	78±1	7	14	3	21
L10-148	44	305	94	8	4	1	25
L10-156	41±1	.	.	.	14	.	.
L10-163	37	252	77±9	5±1	5	4	80
L11-167	44	280	70±1	6	5	3	60
L11-168	44	280	77±7	7	3	3	100
L11-169	44	301	90	7	5	1	20
L11-172	37	263	82±3	4	6	6	100
L11-173	44	282	79±5	7	6	4	67
L11-175	41	249	60±2	7	5	5	100
L11-178	37	256	74±2	7	5	3	60
L11-180	44	273	62	8	5	2	40

Table 4. Continue

Variety	Days of Constant Photoperiod	First Flower Date	Mean Days To Flower	Pollen Rating	Total Stalk Number	Total Flowers	Percent Flowering Stalks
L11-183	41	273	83±1	8±1	5	2	40
L11-185	41	268	83±6	7	5	2	40
L11-187	44	275	72±5	7	6	4	67
L11-189	37	.	.	.	3	.	.
L11-190	40±1	277	94±2	4	11	10	91
L11-191	44	282	72±1	5±1	5	3	60
L12-193	44	.	.	.	4	.	.
L12-197	44	275	69±3	7	5	5	100
L12-199	44	284	76±3	71±	4	2	50
L12-201	44	.	.	.	3	.	.
L12-202	37	263	79±3	8±1	5	2	40
L12-205	37	252	68±1	7	5	5	100
L12-209	41	256	66±1	7	6	5	83
L12-211	41	.	.	.	4	.	.
L12-212	37	.	.	.	6	.	.
L12-213	37	.	.	.	6	.	.
L12-222	44	277	71±2	8	6	5	83
L12-223	44	.	.	.	5	.	.
L12-225	44	.	.	.	6	.	.
L12-227	44	277	75±5	5±1	4	3	75
L12-229	44	.	.	.	4	.	.
L12-230	37	.	.		5	.	.
L12-231	37	.	.		6	.	.
L12-232	41	249	59±1	4	4	4	100
L94-426	39	268	86±3	7	20	6	30
L94-428	39	.	.	.	18	.	.
L94-433	41	.	.	.	18	.	.
L97-128	41±1	252	72±3	8	26	23	88
L98-207	40	259	70±1	6	32	7	22
L98-209	41±1	263	83±5	7	19	9	47
L99-226	41	256	82±2	4	50	28	56
L99-233	41±1	249	63±1	4	33	30	91
LCP81-010	41±1	256	66±2	5	13	11	85
LCP85-384	41	261	81±2	3	39	17	44
LCP86-454	41	261	74±4	3	10	2	20
N27	40	252	74±7	4±1	27	6	22
US01-040	39±1	268	90±8	6±1	8	4	50

Table 5. Crosses and seed made in 2013 sorted by cross number.

Cross	Female	Male	Seed
XL13-001	HOCP92-624	L07-057	6781
XL13-002	L10-138	L07-057	636
XL13-003	L07-057	L07-057	361
XL13-004	HO09-840	HO11-556	280
XL13-005	HOCP92-624	HO11-556	2550
XL13-006	L11-175	HO11-556	83
XL13-007	HO11-556	HO11-556	324
XL13-008	L11-175	HOCP04-838	154
XL13-009	L99-233	HOCP04-838	832
XL13-010	HOCP04-838	HOCP04-838	693
XL13-011	L11-175	L12-232	45
XL13-012	L99-233	L12-232	445

Table 5. Continue.

Cross	Female	Male	Seed
XL13-013	L12-232	L12-232	0
XL13-014	HO11-556	13P1	111
XL13-015	HOCP04-838	13P1	63
XL13-016	L12-232	13P1	0
XL13-017	L99-233	13P1	610
XL13-018	L11-175	L08-090	44
XL13-019	L09-099	L08-090	0
XL13-020	L99-233	L08-090	934
XL13-021	L08-090	L08-090	13
XL13-022	HO91-552	HOCP04-838	3021
XL13-023	HOCP91-552	L99-233	2653
XL13-024	L99-233	L99-233	462
XL13-025	HO09-840	HOCP04-838	254
XL13-026	L12-205	HOCP04-838	239
XL13-027	L97-128	HOCP04-838	0
XL13-028	L06-001	HOCP04-838	24
XL13-029	L08-090	L99-233	81
XL13-030	L08-090	L09-123	13
XL13-031	HO09-840	N27	0
XL13-032	L97-128	N27	0
XL13-033	HOCP92-624	N27	18
XL13-034	L12-205	N27	0
XL13-035	L12-232	L99-233	326
XL13-036	L10-163	L99-233	471
XL13-037	L07-457	L99-233	554
XL13-038	HO11-556	HO06-563	227
XL13-039	L99-233	13P2	128
XL13-040	L10-163	13P2	419
XL13-041	L10-138	13P2	471
XL13-042	L07-057	13P2	509
XL13-043	HOCP11-544	13P3	515
XL13-044	HOCP92-624	13P3	3665
XL13-045	L05-448	13P3	336
XL13-046	L05-457	13P3	0
XL13-047	L10-138	13P3	99
XL13-048	HO09-950	L99-233	27
XL13-049	L97-128	L99-233	109
XL13-050	L09-123	L99-233	87
XL13-051	L12-205	L99-233	0
XL13-052	HO06-563	L99-233	14
XL13-053	L05-457	HO09-840	123
XL13-054	L08-090	HOCP11-544	115
XL13-055	HOCP95-951	HOCP11-544	0
XL13-056	L09-123	HOCP11-544	0
XL13-057	L97-128	HOCP11-544	20
XL13-058	L05-457	HOCP11-544	562
XL13-059	L10-138	HOCP91-552	456
XL13-060	L05-448	HOCP91-552	10
XL13-061	HOCP00-950	L01-299	0
XL13-062	L97-128	L01-299	30
XL13-063	HOCP04-838	13P4	22
XL13-064	HO09-840	13P4	225
XL13-065	L05-457	L99-233	918
XL13-066	HOCP00-950	L99-233	0
XL13-067	HO06-563	L99-226	0
XL13-068	HOCP00-950	L99-226	0
XL13-069	L12-205	L99-226	0
XL13-070	HOCP11-544	L99-226	0
XL13-071	L12-209	L99-226	16
XL13-072	L99-226	L99-226	0
XL13-073	L12-209	HOCP04-838	86
XL13-074	L09-123	HOCP04-838	47
XL13-075	L09-099	HOCP04-838	0
XL13-076	HOCP11-537	HOCP04-838	30
XL13-077	L12-209	L99-233	0
XL13-078	L06-038	L99-233	0
XL13-079	L97-128	L99-233	0
XL13-080	HOCP11-537	L99-233	0
XL13-081	L06-038	L01-299	0
XL13-082	L11-178	L01-299	30
XL13-083	HO11-556	L01-299	13
XL13-084	L05-457	L01-299	0
XL13-085	L01-299	L01-299	41
XL13-086	L07-057	L08-090	0
XL13-087	L06-038	L08-090	0
XL13-088	L06-001	L08-090	0
XL13-089	L08-090	L08-090	50
XL13-090	HO11-528	L08-090	0
XL13-091	L97-128	L08-090	0
XL13-092	L05-457	L08-090	0
XL13-093	L09-123	L08-090	0
XL13-094	LCP81-010	13P5	164
XL13-095	N27	13P5	262
XL13-096	L99-233	13P5	621
XL13-097	L05-448	13P5	0
XL13-098	L06-001	13P5	0
XL13-099	L06-038	L08-090	0
XL13-100	L97-128	L08-090	11
XL13-101	HOCP04-838	L08-090	122
XL13-102	L08-090	L08-090	0
XL13-103	HO06-563	L01-299	12
XL13-104	HOCP00-950	L01-299	0
XL13-105	L12-205	L01-299	0
XL13-106	L97-128	L01-299	0
XL13-107	HOCP11-537	L01-299	127
XL13-108	L06-001	L01-299	30
XL13-109	HO06-563	L08-090	0
XL13-110	HO11-529	L08-090	0
XL13-111	HOCP00-950	L08-090	0
XL13-112	HOCP92-624	L08-090	3

Table 5. Continue.

Cross	Female	Male	Seed
XL13-113	HOCP91-552	L08-090	5
XL13-114	HOCP92-642	L08-090	0
XL13-115	L98-207	L08-090	21
XL13-116	L11-175	L08-090	31
XL13-117	L09-123	L08-090	0
XL13-118	L97-128	L08-090	0
XL13-119	L05-457	L08-090	105
XL13-120	L08-090	L08-090	11
XL13-121	L98-207	L99-233	0
XL13-122	L05-457	HOCP 96-561	74
XL13-123	HOCP00-950	HOCP97-609	12
XL13-124	HO06-563	HOCP97-609	11
XL13-125	L97-128	HOCP97-609	9
XL13-126	HOCP11-548	HOCP97-609	492
XL13-127	HOCP95-951	HOCP97-609	56
XL13-128	HOCP11-548	13P6	542
XL13-129	L01-299	13P6	0
XL13-130	L99-226	13P6	158
XL13-131	L06-001	13P6	0
XL13-132	HO11-528	L01-299	0
XL13-133	HO95-988	L01-299	0
XL13-134	HOCP04-847	L01-299	0
XL13-135	HOCP00-950	L01-299	0
XL13-136	HOCP00-950	L99-226	0
XL13-137	HOCP92-624	L99-226	0
XL13-138	HOCP85-845	L99-226	189
XL13-139	L12-209	LCP85-384	0
XL13-140	L97-128	LCP85-384	0
XL13-141	L06-040	LCP85-384	27
XL13-142	L09-099	LCP85-384	8
XL13-143	L98-207	LCP85-384	17
XL13-144	L06-040	L01-299	0
XL13-145	HOCP85-845	L01-299	101
XL13-146	HOCP00-950	L01-299	106
XL13-147	HOCP95-951	L01-299	0
XL13-148	L98-207	L01-299	0
XL13-149	L10-163	13P7	30
XL13-150	L08-090	13P7	0
XL13-151	HOCP11-550	13P7	0
XL13-152	HOCP97-609	13P7	26
XL13-153	HOCP11-548	HOCP96-561	131
XL13-154	LCP81-010	HOCP96-561	90
XL13-155	L11-183	HOCP96-561	0
XL13-156	HOCP85-845	HOCP96-561	21
XL13-157	HOCP96-561	HOCP96-561	34
XL13-158	HO11-532	HOCP96-540	34
XL13-159	L97-128	HOCP96-540	0
XL13-160	HOCP11-550	HOCP96-540	0
XL13-161	HOCP11-504	HOCP96-540	0
XL13-162	HOCP96-540	HOCP96-540	2205
XL13-163	HO95-988	L01-299	23
XL13-164	HOCP11-504	L01-299	38
XL13-165	HOCP85-845	L01-299	132
XL13-166	L98-209	L01-299	36
XL13-167	L06-040	L01-299	0
XL13-168	HOCP11-548	L99-226	38
XL13-169	HOCP92-624	L99-226	64
XL13-170	HOCP95-951	L99-226	20
XL13-171	L11-183	L99-226	0
XL13-172	HOCP00-950	HOCP96-540	0
XL13-173	HOCP85-845	HOCP96-540	722
XL13-174	LCP85-384	13P8	55
XL13-175	N27	13P8	26
XL13-176	L99-233	13P8	11
XL13-177	HOCP96-540	13P8	0
XL13-178	HOCP11-537	13P8	51
XL13-179	LCP86-454	13P8	18
XL13-180	HOCP92-624	L99-226	182
XL13-181	L06-040	L99-226	0
XL13-182	HOCP00-950	L99-226	83
XL13-183	HOCP91-552	L99-226	1209
XL13-184	HOCP01-517	L99-226	181
XL13-185	L11-178	HOCP11-504	25
XL13-186	HOCP00-950	HOCP11-504	0
XL13-187	HO07-617	HOCP11-504	0
XL13-188	HOCP92-624	HOCP11-504	59
XL13-189	HOCP00-950	L99-233	0
XL13-190	HOCP85-845	L99-233	1368
XL13-191	HOCP91-552	L99-233	948
XL13-192	HOCP92-624	L99-233	1782
XL13-193	HOCP00-950	L01-299	62
XL13-194	HOCP85-845	L01-299	92
XL13-195	HOCP91-552	L01-299	1835
XL13-196	HOCP01-517	L01-299	362
XL13-197	L11-178	HOCP96-540	150
XL13-198	HOCP01-517	HOCP96-540	1174
XL13-199	HOCP00-950	HOCP96-540	4
XL13-200	L98-209	HOCP96-540	132
XL13-201	HOCP96-561	13P9	577
XL13-202	L11-172	13P9	333
XL13-203	L08-090	13P9	0
XL13-204	L11-172	13P9	155
XL13-205	HO11-532	13P9	336
XL13-206	HO09-840	HO08-717	0
XL13-207	L05-457	HO08-717	0
XL13-208	L06-001	HO08-717	0
XL13-209	L94-426	HO08-717	0
XL13-210	L12-202	LCP81-010	0
XL13-211	L06-040	LCP81-010	38
XL13-212	HOCP92-618	LCP81-010	36

Table 5. Continue.

Cross	Female	Male	Seed
XL13-213	HOCP92-624	LCP81-010	394
XL13-214	HOCP85-845	LCP81-010	11
XL13-215	HO11-528	HOCP96-540	82
XL13-216	L98-209	HOCP96-540	605
XL13-217	L05-457	HOCP96-540	552
XL13-218	HOCP11-504	HOCP96-540	168
XL13-219	L11-185	HOCP96-540	374
XL13-220	HO09-840	HOCP96-540	464
XL13-221	L10-146	HOCP04-838	0
XL13-222	HOCP92-618	HOCP04-838	0
XL13-223	HOCP04-847	HOCP04-838	17
XL13-224	L06-001	HOCP04-838	0
XL13-225	HO95-988	HOCP04-838	91
XL13-226	HOCP01-517	HOCP04-838	74
XL13-227	HOCP04-838	HOCP04-838	0
XL13-228	HOCP04-847	L99-226	0
XL13-229	LCP86-454	L99-226	136
XL13-230	L09-123	L99-226	18
XL13-231	HOCP05-902	L99-226	45
XL13-232	HOCP85-845	L11-172	15
XL13-233	HOCP95-951	L11-172	376
XL13-234	HOCP00-950	L11-172	0
XL13-235	HOCP92-618	L11-172	23
XL13-236	L05-457	L01-299	0
XL13-237	HOCP92-624	L01-299	33
XL13-238	HOCP11-576	L01-299	0
XL13-239	HOCP00-950	L01-299	0
XL13-240	L09-123	L01-299	0
XL13-241	HOCP11-544	13P10	0
XL13-242	L08-090	13P10	0
XL13-243	HOCP91-552	13P10	922
XL13-244	HOCP85-845	13P10	995
XL13-245	HO10-937	13P10	937
XL13-246	US01-040	13P10	118
XL13-247	L99-233	13P10	0
XL13-248	HOCP01-523	13P10	32
XL13-249	L07-057	13P10	156
XL13-250	HOCP11-550	13P10	0
XL13-251	HOCP01-523	13P10	134
XL13-252	L05-448	13P10	265
XL13-253	HO09-840	LCP85-384	437
XL13-254	HOCP85-845	LCP85-384	174
XL13-255	HOCP11-544	LCP85-384	46
XL13-256	HO08-709	LCP85-384	0
XL13-257	HOCP04-847	LCP85-384	34
XL13-258	L09-099	HOCP91-552	0
XL13-259	L09-123	HOCP91-552	287
XL13-260	L10-146	HOCP91-552	185
XL13-261	L99-233	HOCP91-552	368
XL13-262	HO10-937	LCP85-384	231
XL13-263	HO04-847	LCP85-384	16
XL13-264	L99-233	LCP85-384	346
XL13-265	L10-146	LCP85-384	0
XL13-266	L09-123	HOCP91-552	0
XL13-267	L05-457	HOCP91-552	53
XL13-268	HOCP92-624	HOCP91-552	182
XL13-269	L06-038	HOCP91-552	0
XL13-270	HOCP11-544	L01-299	24
XL13-271	HOCP02-618	13P11	46
XL13-272	HOCP04-838	13P11	9
XL13-273	HOCP11-539	13P11	26
XL13-274	L08-090	13P11	13
XL13-275	HOCP01-517	N27	17
XL13-276	HOCP09-804	HOCP92-618	156
XL13-277	HO06-563	HOCP92-618	44
XL13-278	HOCP10-900	HOCP92-618	627
XL13-279	HOCP92-624	HOCP92-618	991
XL13-280	L11-183	L08-090	0
XL13-281	L94-426	L08-090	0
XL13-282	HOCP96-540	L99-233	4807
XL13-283	HOCP96-540	LCP81-010	2257
XL13-284	HO10-937	HO11-510	0
XL13-285	HOCP00-950	HO11-510	23
XL13-286	HOCP95-951	HO11-510	148
XL13-287	L11-180	HO11-510	158
XL13-288	L11-180	HOCP92-618	29
XL13-289	HOCP95-951	HOCP92-618	209
XL13-290	L05-457	HOCP92-618	401
XL13-291	L94-426	HOCP92-618	0
XL13-292	LCP85-384	13P12	116
XL13-293	HOCP92-618	13P12	158
XL13-294	L07-057	13P12	276
XL13-295	US01-040	13P12	295
XL13-296	HOCP96-540	13P12	1835
XL13-297	HO07-613	L01-299	95
XL13-298	HOCP01-552	L01-299	1395
XL13-299	HOCP85-845	L01-299	89
XL13-300	HOCP92-624	L01-299	1026
XL13-301	HOCP95-951	L01-299	0
XL13-302	L12-197	L01-299	1164
XL13-303	HOCP96-540	L99-226	1505
XL13-304	HOCP96-561	L99-226	319
XL13-305	L06-040	L99-226	21
XL13-306	L11-187	L99-226	45
XL13-307	L12-197	L99-226	779
XL13-308	HOCP91-552	L99-226	1304
XL13-309	HO11-510	HOCP04-838	570
XL13-310	HOCP92-624	HOCP04-838	160
XL13-311	L92-128	HOCP01-523	0
XL13-312	HOCP92-624	HOCP01-523	226

Table 5. Continue.

Cross	Female	Male	Seed
XL13-313	HO10-900	HOCP01-523	156
XL13-314	L12-197	L08-090	54
XL13-315	L97-128	L08-090	0
XL13-316	HOCP00-950	L08-090	0
XL13-317	HO11-512	L06-038	542
XL13-318	HOCP11-559	L06-038	0
XL13-319	HO11-550	L06-038	16
XL13-320	HOCP11-539	13P11	0
XL13-321	L09-099	13P11	125
XL13-322	L11-183	13P11	0
XL13-323	L01-299	13P11	13
XL13-324	HOCP92-624	13P11	393
XL13-325	HOCP92-618	13P11	0
XL13-326	L97-128	13P11	0
XL13-327	L01-283	13P11	109
XL13-328	HOCP97-609	13P11	71
XL13-329	CP83-644	HOCP96-561	86
XL13-330	L94-426	HOCP96-561	0
XL13-331	HO06-563	HOCP96-561	10
XL13-332	L11-190	HOCP96-561	34
XL13-333	HOCP91-552	HOCP96-561	1644
XL13-334	HOCP00-950	HOCP96-561	0
XL13-335	L11-187	HOCP96-561	8
XL13-336	L11-172	13P12	1077
XL13-337	L99-233	13P12	500
XL13-338	HOCP96-540	13P12	2027
XL13-339	L01-283	13P12	530
XL13-340	L99-226	13P12	23
XL13-341	HO08-717	13P12	1187
XL13-342	HOCP04-838	13P12	290
XL13-343	HOCP01-517	13P12	2849
XL13-344	HOCP92-624	L01-299	109
XL13-345	HOCP00-950	L01-299	136
XL13-346	HOCP91-552	L01-299	1053
XL13-347	HO06-563	L01-299	0
XL13-348	L97-128	L01-299	19
XL13-349	HO11-510	LCP81-010	307
XL13-350	L97-128	LCP81-010	19
XL13-351	L12-222	LCP81-010	17
XL13-352	HOCP10-900	LCP81-010	358
XL13-353	HOCP11-559	LCP81-010	26
XL13-354	HOCP00-950	LCP81-010	65
XL13-355	HOCP91-552	L08-090	580
XL13-356	L12-227	L08-090	270
XL13-357	HO07-613	L08-090	188
XL13-358	L06-001	L08-090	23
XL13-359	HO10-937	L08-090	540
XL13-360	HO11-510	L08-090	493
XL13-361	HO11-517	L08-090	0
XL13-362	L06-040	L99-226	667
XL13-363	HOCP96-540	L99-226	3290
XL13-364	HOCP00-950	L99-226	397
XL13-365	HOCP85-845	L99-226	861
XL13-366	L98-209	L99-226	57
XL13-367	L11-187	L99-226	15
XL13-368	L99-226	L99-226	0
XL13-369	L97-128	L99-233	17
XL13-370	HOCP09-814	L99-233	2548
XL13-371	L06-040	L99-233	160
XL13-372	HOCP11-559	L99-233	0
XL13-373	HOCP85-845	L99-233	837
XL13-374	L11-185	L01-299	285
XL13-375	HOCP11-550	L01-299	175
XL13-376	L11-168	L01-299	101
XL13-377	HOCP00-950	L01-299	43
XL13-378	HOCP09-814	L01-299	1048
XL13-379	HOCP04-847	L01-299	6
XL13-380	L98-209	L01-299	0
XL13-381	L06-040	LCP85-384	69
XL13-382	L12-222	LCP85-384	0
XL13-383	CP83-644	LCP81-010	0
XL13-384	HOCP92-624	LCP81-010	425
XL13-385	L97-128	HOCP11-536	0
XL13-386	L11-167	HOCP11-536	77
XL13-387	HOCP11-516	L11-190	88
XL13-388	HO07-617	L11-190	37
XL13-389	HO07-613	L11-190	96
XL13-390	L11-167	HOCP11-539	30
XL13-391	HO08-709	HOCP11-539	104
XL13-392	L05-448	13P13	428
XL13-393	HOCP97-609	13P13	119
XL13-394	L01-299	13P13	107
XL13-395	HOCP92-618	L01-283	0
XL13-396	HOCP96-540	L01-283	1717
XL13-397	L11-173	L01-283	199
XL13-398	L11-168	L01-299	400
XL13-399	L11-173	L01-299	407
XL13-400	L98-207	L01-299	352
XL13-401	L94-426	L01-299	171
XL13-402	L07-057	L01-299	863
XL13-403	L01-299	L01-299	10
XL13-404	HOCP96-540	LCP85-384	3072
XL13-405	L11-167	LCP85-384	1255
XL13-406	HOCP85-845	LCP85-384	547
XL13-407	LCP85-384	LCP85-384	118
XL13-408	L12-222	L08-090	0
XL13-409	HOCP92-624	L11-190	658
XL13-410	HOCP00-950	L11-190	0
XL13-411	HOCP09-814	L11-190	560
XL13-412	HOCP11-539	L11-190	403

Table 5. Continue.

Cross	Female	Male	Seed
XL13-413	L11-190	L11-190	24
XL13-414	L11-191	HO11-573	391
XL13-415	HO11-573	HO11-573	312
XL13-416	L12-197	HO06-563	334
XL13-417	HO08-709	HO06-563	1252
XL13-418	LCP81-010	HO06-563	799
XL13-419	L12-199	HO06-563	30
XL13-420	US01-040	LCP85-384	210
XL13-421	CP83-644	LCP85-384	1262
XL13-422	HOCP01-517	LCP85-384	1912
XL13-423	HO08-709	L11-191	1790
XL13-424	HOCP01-517	L11-191	648
XL13-425	L06-040	L11-191	49
XL13-426	L11-191	L11-191	51
XL13-427	HOCP04-847	HO11-565	0
XL13-428	HO11-556	HO11-565	31
XL13-429	HOCP96-540	13P14	776
XL13-430	HO06-530	13P14	199
XL13-431	L98-207	13P14	193
XL13-432	L98-209	13P14	174
XL13-433	L01-299	13P14	8
XL13-434	HOCP01-517	13P14	1076
XL13-435	HO07-613	L99-226	223
XL13-436	L01-283	L99-226	151
XL13-437	L06-040	L99-226	140
XL13-438	L99-226	L99-226	38
XL13-439	L10-163	HO11-515	0
XL13-440	L12-199	HO11-515	0
XL13-441	HOCP11-516	HO11-515	0
XL13-442	HO11-515	HO11-515	36
XL13-443	HOCP91-559	L11-190	0
XL13-444	HO08-709	L12-227	568
XL13-445	L99-226	13P15	75
XL13-446	HOCP11-515	13P15	649
XL13-447	L05-448	13P15	34
XL13-448	L09-099	13P15	881
XL13-449	L06-040	HOCP10-900	172
XL13-450	HOCP00-950	HOCP96-561	0
XL13-451	L06-040	HOCP11-559	0
XL13-452	HOCP11-565	HOCP04-838	0
XL13-453	HOCP11-565	HOCP96-540	15
XL13-454	HOCP00-950	HOCP96-540	0
XL13-455	HOCP92-624	HOCP96-540	62
XL13-456	HOCP01-517	HOCP96-540	58
XL13-457	HO11-512	L99-226	1016
XL13-458	HO08-709	LCP85-384	0
XL13-459	HO08-717	LCP85-384	0
XL13-460	L94-426	LCP85-384	0
XL13-461	HOCP96-561	L06-001	20
XL13-462	HO95-988	L06-001	67
XL13-463	L12-222	L06-001	16
XL13-464	L12-197	L06-001	470
XL13-465	L06-001	L06-001	0
XL13-466	HOCP96-561	HO11-515	26
XL13-467	HOCP01-523	13P16	63
XL13-468	HOCP85-845	13P16	68
XL13-469	HOCP92-618	13P16	298
XL13-470	HO09-840	L99-226	558
XL13-471	HO11-515	L99-226	101
XL13-472	HO11-517	L99-226	38
XL13-473	N27	L99-226	1042
XL13-474	L98-209	L99-226	27
XL13-475	L99-226	L99-226	255
XL13-476	HOCP04-847	L99-226	10
XL13-477	L12-207	L99-226	0
XL13-478	HOCP92-624	L06-001	193
XL13-479	L06-001	L06-001	0
XL13-480	HOCP09-814	HOCP96-561	257
XL13-481	HOCP96-561	HOCP96-561	30
XL13-482	HO06-530	L06-001	110
XL13-483	HO11-517	L06-001	39
XL13-484	HOCP96-561	L06-001	74
XL13-485	L06-001	L06-001	219
XL13-486	L98-209	L11-190	36
XL13-487	L11-190	L11-190	23
XL13-488	L06-040	LCP85-384	76
XL13-489	HOCP11-539	LCP85-384	218
XL13-490	HO11-517	L99-226	52
XL13-491	HOCP95-561	HO07-613	402
XL13-492	HOCP00-950	L06-001	74
XL13-493	HOCP96-561	L06-001	122
XL13-494	HO11-510	L06-001	830
XL13-495	L11-173	L06-001	25
XL13-496	L06-001	L06-001	0
XL13-497	HOCP11-516	L11-190	50
XL13-498	L11-173	L11-190	130
XL13-499	US01-040	L11-190	67
XL13-500	L11-190	L11-190	0
XL13-501	L11-187	L99-226	291
XL13-502	HOCP11-565	L01-299	16
XL13-503	L11-169	L01-299	229
XL13-504	HO08-709	L01-299	255
XL13-505	L99-226	L01-299	166
XL13-506	L01-299	L01-299	28
XL13-507	HO08-717	13P17	25
XL13-508	L11-190	13P17	145
XL13-509	L99-226	13P17	490
XL13-510	HO08-711	HOCP96-540	0

Table 5. Continue.

Cross	Female	Male	Seed
XL13-511	HOCP02-618	L11-190	88
XL13-512	L11-190	L06-001	0
XL13-513	HO11-573	L99-226	114
XL13-514	L98-209	L99-226	88
XL13-515	HOCP02-618	L99-226	0
XL13-516	L11-168	L99-226	37
XL13-517	L97-128	L99-226	0
XL13-518	HOCP04-838	L99-226	12
XL13-519	L99-226	L99-226	396
XL13-520	L10-148	L01-283	0
XL13-521	HOCP02-618	L01-283	100
XL13-522	HOCP92-624	L01-283	65
XL13-523	L01-299	L06-001	93
XL13-524	HOCP11-565	L06-001	30
XL13-525	HOCP96-540	L06-001	62
XL13-526	L09-099	13P18	570
XL13-527	HOCP09-800	13P18	61
XL13-528	HOCP11-544	13P18	0
XL13-529	L01-283	L06-001	0

SELECTIONS, ADVANCEMENTS, AND ASSIGNMENTS OF THE LSU AGCENTER'S SUGARCANE VARIETY DEVELOPMENT PROGRAM FOR 2013

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SUMMARY

In the selection phase of the LSU AgCenter's Sugarcane Variety Development Program, superior clones are advanced through the single stool, first line, second line, and increase stages of the breeding program. In the first stubble crop of the second-line trials, those clones with acceptable breeding or commercial value are assigned a permanent variety number. A total of 78,747 seedlings from 170 crosses were planted in the field in the spring of 2013. The majority of these seedlings are progeny of bi-parental crosses among commercial and elite experimental varieties. In the fall of 2013, family selection was practiced on the 45,543 stubble seedlings surviving the winter. This selection resulted in the planting of 1,985 first-line trial plots. At the same time, superior clones were also selected and advanced through subsequent stages (484 to second line trials, 190 to the increase stage). Assignments of permanent "L13" numbers were given to the 30 best clones of the 2008 crossing series.

PROCEDURES

In the selection stage of the LSU AgCenter's Sugarcane Variety Development Program, single stools are established from seed generated in the crossing stage. After evaluating and selecting the families for cane yield potential in the cross appraisal studies, clones with desirable phenotypes are selected and advanced through single stool, first line, second line, and increase stages. In the first stubble crop of the second-line trials, clones judged to have breeding or commercial value are assigned a permanent variety number and advanced to the nursery stage of testing.

RESULTS AND DISCUSSION

A total of 78,747 seedlings from 170 crosses of the 2012 crossing series were planted to the field in the spring of 2013 (Table 1). Many of these seedlings were progeny of crosses among commercial and superior experimental varieties. In the fall of 2013, individual selection was practiced on the 45,543 stubble single stools of the 2011 crossing series that survived the winter. The 1,985 clones selected and advanced from the single stools were planted in 10-foot first-line trial plots. Dates of planting and harvesting of all plots in the selection phase of the program can be found in Table 2.

The 2,416 first-line trial plots of the 2010 crossing series were rated for cane yield and pest resistance in August of 2013 (Table 3). After screening for cane yield rating, acceptable clones were further evaluated for pest resistance (diseases and borer injury) stalk quality, and Brix (Table 3). This second stage of advancement was concluded with the planting of 484 clones in single row 16-foot second line trials plots.

Stalk counts were made on the 393 plant-cane second line trial plots of the 2009 crossing series in August 2013. Based on these counts and sucrose lab data collected in 2012, 190 clones

were planted in two single row 16-foot plots representing the increase stage of the program (Table 4). One replication was planted in light soil and the other in heavy soil. These clones will be candidates for assignment in 2014. Of the 93 candidates from the first stubble crop of the second line trial plots, the best 30 clones from the 2008 crossing series were assigned permanent "L13" numbers (Table 5). These newly assigned "L13" varieties were then planted in replicated nursery trials at three on station locations (Sugar Research Station, Iberia Research Station, USDA-ARS Ardoyne Farm).

The advancement summary of clones from crosses made in 2008 through 2012 is shown in Table 6. Crosses are sorted by female parent in ascending order, with the percentile ranking given for each cross in each stage of the program.

Table 1. Summary of selections, advancements and assignments made during 2013 by the Louisiana, "L" Sugarcane Variety Development Program's personnel.

Crossing series	Crosses		Plants transplanted	Over-wintered plants	Advanced to			
	Progeny test	Selection program			1st line	2nd line	Increase	On-station Nurseries (L13 Assignments)
			---------- number of clones ----------					
X08	--	153	76213	39329	1730	522	150	30
X09	60	215	76095	41581	1888	393	190	
X10	50	211	90294	61704	2416	484		
X11	58	166	75703	45543				
X12	40	170	78747					

Table 2. Dates of seedling and line trials planted or harvested in 2013.

Crossing Series	Test	Crop	Date Planted	Date Harvested
X12	Seedlings	Planted	4/9 – 4/23	
X12	Progeny Test	Planted	4/22	
X11	Seedlings	First Stubble	4/9 – 4/20	10/1 – 10/10
X11	Progeny Test	First Stubble	4/19	Not Harvested
X11	First Line Trials	Planted	10/11/13	
X10	First Line Trials	Plant-cane	9/21/12	9/25/13
X09	First Line Trials	First Stubble	9/30/11	12/4/13
X10	Second Line Trials	Planted	9/27/13	
X09	Second Line Trials	Plant-cane	10/12/12	11/18/13
X08	Second Line Trials	First Stubble	09/14/11	10/22/13
X07	Second Line Trials	Second Stubble	9/23/10	11/7/13
X09	Light Soil Increase	Planted	10/17/13	
X08	Light Soil Increase	Plant-cane	10/30/12	12/5/13
X07	Light Soil Increase	First Stubble	10/25/11	11/13/13
X06	Light Soil Increase	Second Stubble	9/23/10	11/20/13
X09	Heavy Soil Increase	Planted	10/17/13	
X08	Heavy Soil Increase	Plant-cane	10/30/12	11/25/13
X07	Heavy Soil Increase	First Stubble	10/25/11	11/13/13
X06	Heavy Soil Increase	Second Stubble	9/23/10	11/8/13

Table 3. Numbers of experimental clones dropped for identified faults in the 2010 crossing series first-line trials.

	Fault	
Trait	Frequency	Percent
---------- 2416 clones enter first round of evaluation ----------		
Initial Selection (Rating)	747	30.9
---------- 1669 clones enter second round of evaluation ----------		
Pith	341	14.1
Smut	14	0.60
Lodge	5	0.22
Diameter	6	0.26
Leaf Scald	10	0.41
Other	17	0.70
---------- 393 clones dropped ----------		
----------1276 clones enter third round of evaluation ----------		
Brix	792	32.8
Clones advanced	484	20.0

Table 4. Number of experimental clones dropped for identified faults in the 2009 crossing series of the plant-cane second line trial prior to advancement to the increase stage.

	Fault	
Trait	Frequency	Percent
---------- 393 clones enter first round of evaluation ----------		
Stalk count <75 per plot & observations	163	41.5
Lodged	10	2.5
Pith / Tube	22	5.6
Other	8	2.1
---------- 203 clones dropped ----------		
Clones advanced to Increase stage	190	48.3

Table 5. Yield data of the 2013 “L” assignments made in the first-stubble second line trials.

Variety	Female	Male	Sugar Per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
HoCP96-540	LCP86-454	LCP85-384	10696	55.6	193	2.62	42426	10.5
L99-226	CP89-846	LCP81-030	14689	74	206	2.41	60122	11.7
L01-299	L93-365	LCP85-384	11380	58.3	195	2.27	51954	11.9
L03-371	CP83-644	LCP82-089	7906	39.7	202	1.99	40157	9.5
HoCP04-838	HOCP85-845	LCP85-384	6884	35.2	196	1.87	37661	11.4
L13-234	L04-408	HOCP04-807	7251	32.5	223	2.21	29494	11.3
L13-235	CP83-644	HOCP04-836	6670	32.4	206	2.23	29040	11.1
L13-236	L98-207	08P1	8265	35.9	230	2.01	35846	10.8
L13-237	HOCP92-624	08P8	8362	31.4	266	2.17	29040	10.9
L13-238	LCP81-010	L04-410	6459	30	215	1.87	32216	11.3
L13-239	HOCP92-624	L99-233	7656	38.1	201	1.63	46736	12.6
L13-240	L98-207	08P4	6989	30	233	1.7	35393	11.7
L13-241	HOCP92-624	HOCP96-540	9462	47.8	198	2.27	42199	10.4
L13-242	HOCP00-930	L04-408	8186	41.8	196	1.77	47190	12.2
L13-243	L05-445	L05-450	9443	43.7	216	2.05	42653	11.4
L13-244	N27	L01-299	10587	54	196	2.04	53089	11.3
L13-245	HOCP02-623	HOCP01-523	11923	47.5	251	1.81	52635	10.1
L13-246	HOCP02-623	HOCP01-523	10720	42	255	1.7	49459	10.9
L13-247	HOCP85-845	08P13	10212	43.6	234	2.44	35846	12.3
L13-248	L98-207	LCP81-010	12040	61.4	196	2.85	43106	6.9
L13-249	N27	LCP85-384	11093	57.8	192	2.32	49913	12.1
L13-250	HOCP02-623	08P13	10111	43.6	232	1.87	46736	13.2
L13-251	HOCP04-843	HOCP04-809	9754	43.3	225	1.93	44921	10.8
L13-252	L02-316	08P20	7210	37.7	191	1.56	48551	12.6
L13-253	HOCP92-648	HOCP04-836	10982	48	229	2.38	40384	11.9
L13-254	L07-057	08P22	7065	33.8	209	1.59	42653	10.3
L13-255	L07-057	08P22	7669	44.8	171	1.77	50820	9.5
L13-256	L01-299	08P1	7947	33.1	240	1.45	45829	12
L13-257	LCP81-010	08P1	7116	37.3	191	1.96	38115	8.7
L13-258	L01-299	08P1	7426	38.5	193	1.6	48098	11.8
L13-259	L07-059	08P28	6714	31.8	211	1.28	49913	10.2
L13-260	L97-128	08P8	7378	37.5	197	1.78	42199	12.1
L13-261	HOCP96-540	L99-226	6757	35.4	191	2.26	31309	11.7
L13-262	HOCP01-523	L99-233	8769	40.8	215	2.02	40384	13.7
L13-263	HOCP01-517	L98-207	9146	42.7	214	2.07	41291	11.2
Mean			8883	42.3	212	1.99	42782	11.2
Min			6459	30	171	1.28	29040	6.9
Max			14689	74	266	2.85	60122	13.7
SD			1946	9.9	21	0.34	7451	1.27

Table 6. Advancement summary of the crosses in the 2008 through 2011 series.

			1 st Line		2 nd Line		Increases		Assignments	
Female	Male	Survive	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile
2008 Crossing Series										
CB79-318	LCP85-384	191	3	32	0	14	0	24	0	40
CP79-318	LCP85-384	445	17	76	4	64	0	24	0	40
CP83-644	HOCP04-836	938	11	23	4	37	1	53	1	84
HO95-988	L99-233	247	7	60	2	58	0	24	0	40
HOCP00-930	HOCP91-552	866	21	52	1	29	1	54	0	40
HOCP00-930	L00-266	419	8	41	6	87	3	95	0	40
HOCP00-930	L02-353	465	17	74	6	80	1	62	0	40
HOCP00-930	L04-408	874	10	21	7	58	3	74	1	85
HOCP00-950	08P2	648	34	90	9	86	1	58	0	40
HOCP00-950	08P4	756	15	44	8	72	5	92	0	40
HOCP00-950	08P6	1070	19	36	5	40	1	50	0	40
HOCP00-950	HOCP96-540	98	5	89	2	93	0	24	0	40
HOCP01-517	L98-207	1261	36	62	23	92	9	94	1	82
HOCP01-523	L98-209	546	17	66	5	66	2	77	0	40
HOCP01-523	L99-233	570	22	77	9	89	4	93	1	91
HOCP01-544	L99-233	540	24	81	6	76	1	59	0	40
HOCP01-558	HOCP92-618	419	10	52	2	41	1	65	0	40
HOCP02-610	08P13	465	16	71	4	63	1	62	0	40
HOCP02-610	08P14	1213	17	26	0	14	0	24	0	40
HOCP02-610	08P15	206	14	95	2	69	0	24	0	40
HOCP02-623	08P13	155	3	41	1	55	1	91	1	99
HOCP02-623	08P28	239	7	62	2	60	2	96	0	40
HOCP02-623	HOCP01-523	451	29	93	15	97	2	82	2	97
HOCP02-623	HOCP91-552	226	4	36	0	14	0	24	0	40
HOCP02-623	HOCP96-540	378	3	19	0	14	0	24	0	40
HOCP03-757	L04-425	210	0	8	0	14	0	24	0	40
HOCP04-827	HO95-988	439	21	86	2	39	1	64	0	40
HOCP04-843	HOCP04-809	233	10	80	4	91	2	97	1	97
HOCP85-845	08P13	575	27	84	23	99	7	99	1	91
HOCP85-845	08P20	709	16	49	6	61	2	71	0	40
HOCP85-845	HOCP96-540	200	6	64	0	14	0	24	0	40
HOCP89-846	08P14	613	21	71	5	59	2	73	0	40
HOCP89-846	08P15	456	5	21	0	14	0	24	0	40
HOCP89-846	HOCP96-540	704	16	49	4	48	0	24	0	40
HOCP91-552	05P2	227	4	36	0	14	0	24	0	40
HOCP92-618	HOCP89-846	207	4	41	0	14	0	24	0	40
HOCP92-618	LCP85-384	657	10	28	0	14	0	24	0	40
HOCP92-624	08P8	1543	19	23	7	39	3	61	1	81
HOCP92-624	08P9	1793	27	28	9	43	1	48	0	40
HOCP92-624	HOCP02-623	245	7	62	1	35	0	24	0	40
HOCP92-624	HOCP04-836	225	6	58	1	38	0	24	0	40
HOCP92-624	HOCP89-846	471	7	28	3	53	0	24	0	40
HOCP92-624	HOCP91-552	195	3	28	1	44	0	24	0	40
HOCP92-624	HOCP96-540	460	7	28	5	74	2	81	1	93
HOCP92-624	HOCP96-561	216	6	60	0	14	0	24	0	40

Table. 6. Continue

			1 st Line		2 nd Line		Increases		Assignments	
Female	Male	Survive	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile
HOCP92-624	L00-266	379	19	88	4	72	1	69	0	40
HOCP92-624	L01-299	203	6	64	1	42	0	24	0	40
HOCP92-624	L02-316	248	0	8	0	14	0	24	0	40
HOCP92-624	L98-207	395	5	25	0	14	0	24	0	40
HOCP92-624	L99-233	1068	14	25	6	47	2	60	1	82
HOCP92-624	LCP85-384	962	17	36	4	36	1	52	0	40
HOCP92-648	HOCP04-836	617	25	78	4	55	1	58	1	89
HOCP92-648	L00-266	857	19	46	3	32	1	55	0	40
HOCP92-648	L04-410	734	18	55	10	84	4	86	0	40
HOCP92-648	L92-312	149	7	84	0	14	0	24	0	40
HOCP92-648	L97-137	224	5	46	3	83	0	24	0	40
HOCP92-648	L99-233	205	15	98	5	96	1	84	0	40
HOCP92-648	LCP85-384	484	23	86	10	93	4	95	0	40
HOCP95-951	08P14	566	6	21	1	30	0	24	0	40
HOCP95-951	08P8	1039	32	66	4	34	1	51	0	40
HOCP95-951	HOCP04-824	199	4	44	0	14	0	24	0	40
HOCP95-951	HOCP96-522	213	0	8	0	14	0	24	0	40
HOCP95-951	HOCP96-540	103	0	8	0	14	0	24	0	40
HOCP96-540	08P1	394	0	8	0	14	0	24	0	40
HOCP96-540	08P4	819	0	8	0	14	0	24	0	40
HOCP96-540	08P6	1356	0	8	0	14	0	24	0	40
HOCP96-540	HOCP02-618	477	0	8	0	14	0	24	0	40
HOCP96-540	HOCP91-552	1379	41	64	8	50	1	50	0	40
HOCP96-540	L02-325	418	0	8	0	14	0	24	0	40
HOCP96-540	L99-226	438	16	74	6	85	1	64	1	93
HOCP96-540	L99-233	1579	40	55	15	68	4	66	0	40
L01-283	08P22	1136	0	8	0	14	0	24	0	40
L01-283	08P25	154	3	41	2	81	0	24	0	40
L01-283	08P28	439	7	32	0	14	0	24	0	40
L01-299	08P1	508	23	82	9	91	3	89	2	95
L01-299	08P29	350	24	95	8	95	2	88	0	40
L01-299	08P6	416	29	96	5	77	2	83	0	40
L01-299	08P8	329	8	52	3	65	1	72	0	40
L01-299	HOCP96-561	148	4	58	1	56	0	24	0	40
L01-315	08P13	226	7	66	3	82	0	24	0	40
L01-315	L05-445	212	13	92	5	95	1	82	0	40
L02-316	08P20	238	21	99	4	90	1	79	1	96
L02-316	08P22	236	15	93	2	61	0	24	0	40
L02-316	HOCP96-540	61	2	69	0	14	0	24	0	40
L02-320	HO95-988	322	7	46	2	52	0	24	0	40
L03-396	HOCP91-552	185	6	67	2	73	0	24	0	40
L03-396	L04-410	245	8	69	2	59	0	24	0	40
L03-396	LCP85-384	231	4	34	3	81	1	80	0	40
L04-407	L99-233	305	16	90	3	69	1	73	0	40
L04-408	HOCP04-807	596	13	46	8	83	4	93	1	90
L04-408	HOCP96-540	28	2	97	1	98	0	24	0	40
L04-425	L99-233	276	10	73	3	74	1	76	0	40

Table. 6. Continue

			1 st Line		2 nd Line		Increases		Assignments	
Female	Male	Survive	No	Rank Percentile		Rank Percentile		Rank Percentile		Rank Percentile
L05-445	L05-450	203	9	81	6	97	1	84	1	98
L05-457	L99-233	407	3	18	2	42	1	65	0	40
L06-010	08P23	599	0	8	0	14	0	24	0	40
L06-010	08P24	311	15	86	7	94	2	91	0	40
L07-057	08P22	618	44	97	10	89	7	98	2	95
L07-059	08P28	374	6	32	2	45	1	69	1	94
L93-399	HOCP04-836	134	6	82	1	57	0	24	0	40
L94-426	08P23	399	16	78	5	78	2	85	0	40
L94-426	HO95-988	77	0	8	0	14	0	24	0	40
L94-426	L99-233	212	0	8	0	14	0	24	0	40
L94-428	L05-448	791	21	58	5	52	0	24	0	40
L94-428	LCP85-384	646	2	17	2	32	0	24	0	40
L94-432	L99-233	756	12	32	7	67	1	56	0	40
L97-128	08P8	780	29	74	5	53	1	56	1	88
L97-128	08P9	382	10	56	4	71	1	68	0	40
L97-137	L99-233	777	18	49	1	30	0	24	0	40
L98-197	08P24	351	0	8	0	14	0	24	0	40
L98-197	HOCP96-540	216	0	8	0	14	0	24	0	40
L98-197	L99-226	748	0	8	0	14	0	24	0	40
L98-197	L99-226	889	2	17	1	28	1	54	0	40
L98-197	LCP82-089	342	0	8	0	14	0	24	0	40
L98-207	08P1	879	22	55	8	65	5	87	1	85
L98-207	08P19	380	0	8	0	14	0	24	0	40
L98-207	08P4	985	25	55	6	51	1	52	1	84
L98-207	08P5	332	0	8	0	14	0	24	0	40
L98-207	08P6	199	0	8	0	14	0	24	0	40
L98-207	LCP81-010	540	13	52	4	56	2	78	1	92
L99-233	HOCP96-540	336	9	58	3	63	1	71	0	40
LCP81-010	08P1	737	29	77	7	68	1	57	1	89
LCP81-010	08P4	358	23	93	5	86	2	86	0	40
LCP81-010	HOCP89-846	275	13	84	0	14	0	24	0	40
LCP81-010	HOCP91-552	183	4	46	2	74	2	97	0	40
LCP81-010	HOCP96-561	226	0	8	0	14	0	24	0	40
LCP81-010	L02-316	758	0	8	0	14	0	24	0	40
LCP81-010	L02-316	328	0	8	0	14	0	24	0	40
LCP81-010	L04-410	843	11	25	3	33	3	76	1	86
LCP81-010	L98-207	739	37	88	11	88	3	78	0	40
LCP81-010	L99-233	370	20	91	2	46	1	70	0	40
LCP81-010	L99-233	395	13	69	5	79	0	24	0	40
LCP81-010	L99-233	1251	20	32	5	34	0	24	0	40
LCP81-010	LCP82-089	388	4	19	2	45	1	67	0	40
LCP81-010	LCP85-384	213	0	8	0	14	0	24	0	40
LCP85-384	04P4	687	23	69	8	76	0	24	0	40
LCP85-384	08P2	288	12	79	3	70	1	75	0	40
LCP85-384	08P22	390	7	36	2	44	1	67	0	40
LCP85-384	08P33	158	3	41	2	79	1	90	0	40
LCP85-384	08P5	255	4	32	0	14	0	24	0	40

Table. 6. Continue

			1 st Line		2 nd Line		Increases		Assignments	
Female	Male	Survive	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile
LCP85-384	HOCP96-540	1541	30	41	9	50	0	24	0	40
N27	L01-299	836	19	49	11	82	5	89	1	87
N27	L99-226	181	11	92	1	47	0	24	0	40
N27	LCP85-384	1055	12	21	3	31	2	60	1	83
US79-010	L99-226	233	8	71	1	37	1	80	0	40
US99-004	L99-226	1392	26	41	8	48	1	49	0	40
2009 Crossing Series										
CP83-644	HO05-961	418	11	60	8	94	4	94	.	.
CP83-644	L01-283	118	0	23	0	28	0	33	.	.
CP83-644	L01-283	477	58	99	21	98	.	.	.	.
CP83-644	L99-226	399	29	92	9	95	3	93	.	.
HO01-564	HOCP01-517	213	0	23	0	28	0	33	.	.
HO01-564	L01-299	196	13	91	1	69	1	85	.	.
HO01-564	TUCCP77-042	442	7	52	0	28	0	33	.	.
HO05-961	HOCP02-618	139	4	63	0	28	0	33	.	.
HO05-961	HOCP85-845	270	8	64	5	92	3	96	.	.
HO05-961	L01-299	184	1	48	1	70	0	33	.	.
HO05-961	L99-226	177	0	23	0	28	0	33	.	.
HO05-961	L99-226	429	0	23	0	28	.	.	.	.
HO06-523	L99-233	545	25	76	6	79	4	92	.	.
HO06-523	LCP85-384	131	0	23	0	28	0	33	.	.
HO06-530	HO05-961	184	6	66	0	28	0	33	.	.
HO06-530	HO06-523	162	0	23	0	28	0	33	.	.
HO06-530	L06-038	386	0	23	0	28	0	33	.	.
HO06-537	L99-226	349	17	79	5	85	2	87	.	.
HO06-537	L99-233	388	20	80	5	82	1	72	.	.
HO06-562	L01-283	208	0	23	0	28	0	33	.	.
HO06-562	L01-283	410	17	73	0	28	0	33	.	.
HO06-562	L99-226	302	9	64	3	78	1	78	.	.
HO06-562	L99-226	286	16	82	7	96	3	95	.	.
HO06-562	L99-233	212	0	23	0	28	0	33	.	.
HO06-562	L99-233	369	0	23	0	28	0	33	.	.
HO06-562	LCP85-384	333	10	64	5	87	0	33	.	.
HO06-562	TUCCP77-042	389	2	48	0	28	0	33	.	.
HO06-563	HOCP96-540	173	0	23	0	28	0	33	.	.
HO06-563	HOCP96-540	146	0	23	0	28	0	33	.	.
HO06-563	HOCP96-540	363	0	23	0	28	0	33	.	.
HO06-563	L01-299	262	0	23	0	28	0	33	.	.
HO07-613	L99-226	465	21	75	11	96	5	95	.	.
HO07-617	HO06-523	214	4	54	1	67	1	82	.	.
HO95-988	09P21	343	0	23	0	28	0	33	.	.
HO95-988	09P24	122	0	23	0	28	0	33	.	.
HO95-988	HOCP01-523	131	0	23	0	28	0	33	.	.
HO95-988	HOCP96-540	294	0	23	0	28	0	33	.	.
HO95-988	L01-283	445	15	67	1	57	0	33	.	.

Table. 6. Continue

			1 st Line		2 nd Line		Increases		Assignments	
Female	Male	Survive	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile
HOCP00-930	HOCP96-540	132	0	23	0	28	0	33	.	.
HOCP00-930	HOCP96-540	441	9	55	5	79	3	90	.	.
HOCP00-930	HOCP96-540	235	20	93	1	64	.	.	.	.
HOCP00-930	US01-040	170	0	23	0	28	0	33	.	.
HOCP00-950	HO06-562	514	9	53	0	28	0	33	.	.
HOCP00-950	HOCP96-540	1668	41	59	11	72	6	78	.	.
HOCP00-950	HOCP96-540	307	10	66	1	62	1	76	.	.
HOCP00-950	HOCP96-540	392	13	66	1	59	1	72	.	.
HOCP00-950	HOCP97-609	417	16	71	4	77	0	33	.	.
HOCP00-950	L01-283	854	47	82	16	93	4	82	.	.
HOCP00-950	L01-299	1232	34	62	3	58	4	76	.	.
HOCP00-950	L01-299	637	74	97	10	88	.	.	.	.
HOCP00-950	L06-001	807	27	66	6	74	1	67	.	.
HOCP00-950	L06-001	247	0	23	0	28	.	.	.	.
HOCP00-950	L06-038	396	1	47	0	28	0	33	.	.
HOCP00-950	L06-038	218	9	73	3	83	2	93	.	.
HOCP00-950	L08-076	196	0	23	0	28	0	33	.	.
HOCP00-950	L94-428	218	4	53	1	66	1	80	.	.
HOCP00-950	L94-432	360	0	23	0	28	0	33	.	.
HOCP00-950	L99-226	361	8	56	1	60	0	33	.	.
HOCP00-950	L99-226	132	8	86	2	87	2	97	.	.
HOCP00-950	L99-233	206	2	50	0	28	0	33	.	.
HOCP00-950	L99-233	199	5	59	0	28	.	.	.	.
HOCP00-950	LCP85-384	145	0	23	0	28	0	33	.	.
HOCP00-950	LCP85-384	201	0	23	0	28	0	33	.	.
HOCP00-950	LCP86-454	375	18	78	7	93	2	86	.	.
HOCP00-950	US01-040	240	15	89	1	63	.	.	.	.
HOCP01-523	LCP85-384	174	0	23	0	28	0	33	.	.
HOCP02-610	L01-299	424	24	83	6	84	3	90	.	.
HOCP02-610	HO06-562	173	0	23	0	28	0	33	.	.
HOCP02-610	HOCP01-523	163	0	23	0	28	0	33	.	.
HOCP02-610	HOCP96-540	337	0	23	0	28	0	33	.	.
HOCP02-610	HOCP96-540	244	0	23	0	28	0	33	.	.
HOCP02-610	HOCP97-609	166	0	23	0	28	0	33	.	.
HOCP02-610	L06-001	217	0	23	0	28	0	33	.	.
HOCP02-610	L06-001	218	0	23	0	28	0	33	.	.
HOCP02-610	L94-432	139	9	90	2	85	1	91	.	.
HOCP02-610	L99-233	573	0	23	0	28	0	33	.	.
HOCP02-618	HOCP92-618	132	0	23	0	28	0	33	.	.
HOCP02-623	HOCP96-540	639	0	23	0	28	0	33	.	.
HOCP02-623	L01-299	320	0	23	0	28	0	33	.	.
HOCP02-623	L08-089	194	0	23	0	28	0	33	.	.
HOCP02-623	L94-428	152	0	23	0	28	0	33	.	.
HOCP04-838	HOCP05-904	206	0	23	0	28	0	33	.	.
HOCP04-838	HOCP07-615	382	3	50	0	28	0	33	.	.
HOCP04-838	HOCP91-552	221	0	23	0	28	0	33	.	.
HOCP04-838	HOCP96-540	500	3	49	1	57	1	71	.	.

Table. 6. Continue

			1 st Line		2 nd Line		Increases		Assignments	
Female	Male	Survive	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile
HOCP04-838	L01-283	678	42	88	9	83	5	92	.	.
HOCP04-838	L01-299	508	11	56	3	71	1	70	.	.
HOCP04-838	L06-001	202	0	23	0	28	0	33	.	.
HOCP04-838	L06-038	182	0	23	0	28	0	33	.	.
HOCP04-838	L06-038	160	0	23	0	28	0	33	.	.
HOCP04-838	L94-428	164	6	70	1	72	0	33	.	.
HOCP04-838	L94-428	201	0	23	0	28	0	33	.	.
HOCP04-838	L99-226	980	0	23	0	28	0	33	.	.
HOCP04-838	L99-233	107	0	23	0	28	0	33	.	.
HOCP04-838	L99-233	152	0	23	0	28	0	33	.	.
HOCP04-838	L99-233	207	0	23	0	28	0	33	.	.
HOCP04-847	HOCP96-540	222	10	75	7	97	6	99	.	.
HOCP04-847	L08-089	454	0	23	0	28	0	33	.	.
HOCP05-902	L01-299	380	0	23	0	28	0	33	.	.
HOCP05-918	L01-283	644	16	59	3	67	2	74	.	.
HOCP05-918	L01-299	369	7	54	1	60	0	33	.	.
HOCP85-845	HO95-988	523	33	89	6	80	3	88	.	.
HOCP85-845	HOCP97-609	182	0	23	0	28	0	33	.	.
HOCP92-618	09P24	131	0	23	0	28	0	33	.	.
HOCP92-618	HOCP96-540	102	6	85	1	78	0	33	.	.
HOCP92-618	L01-299	638	60	95	12	93	10	98	.	.
HOCP92-618	L05-448	142	0	23	0	28	0	33	.	.
HOCP92-624	HO01-564	332	0	23	0	28	0	33	.	.
HOCP92-624	HOCP01-523	164	0	23	0	28	0	33	.	.
HOCP92-624	HOCP91-552	172	0	23	0	28	0	33	.	.
HOCP92-624	HOCP96-540	447	0	23	0	28	0	33	.	.
HOCP92-624	L01-283	1178	31	60	2	56	2	69	.	.
HOCP92-624	L01-283	1152	140	99	37	97	.	.	.	.
HOCP92-624	L01-299	419	0	23	0	28	0	33	.	.
HOCP92-624	L01-299	424	34	93	6	84	2	83	.	.
HOCP92-624	L01-299	436	0	23	0	28	.	.	.	.
HOCP92-624	L06-001	131	0	23	0	28	0	33	.	.
HOCP92-624	L06-038	397	0	23	0	28	0	33	.	.
HOCP92-624	L08-089	1118	0	23	0	28	.	.	.	.
HOCP92-624	L98-207	202	0	23	0	28	0	33	.	.
HOCP92-624	L99-226	814	75	94	10	81	3	79	.	.
HOCP92-624	L99-233	552	27	79	4	73	0	33	.	.
HOCP92-648	HOCP96-540	544	33	86	4	74	1	70	.	.
HOCP92-648	L01-283	218	26	98	2	76	1	80	.	.
HOCP92-648	L01-299	436	25	83	7	90	5	96	.	.
HOCP92-648	L94-428	175	4	58	0	28	0	33	.	.
HOCP96-540	09P14	155	0	23	0	28	0	33	.	.
HOCP96-540	L99-233	310	0	23	0	28	0	33	.	.
HOCP96-561	HO05-961	145	0	23	0	28	0	33	.	.
HOCP96-561	HOCP96-540	226	0	23	0	28	0	33	.	.
HOCP96-561	L99-226	629	34	81	2	61	2	75	.	.
HOCP96-561	TUCCP77-042	365	2	48	0	28	0	33	.	.

Table. 6. Continue

			1 st Line		2 nd Line		Increases		Assignments	
Female	Male	Survive	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile
HOCP97-606	L94-426	159	9	83	2	82	1	89	.	.
L01-283	09P13	435	0	23	0	28	0	33	.	.
L01-283	HO06-562	432	0	23	0	28	0	33	.	.
L01-283	HOCP02-610	1106	50	75	13	80	6	86	.	.
L01-283	HOCP02-610	237	27	96	13	99	.	.	.	.
L01-283	HOCP06-523	156	0	23	0	28	0	33	.	.
L01-283	L08-076	405	25	88	2	68	2	84	.	.
L01-283	L94-426	602	16	62	3	69	1	69	.	.
L01-283	L94-428	670	28	74	4	71	1	68	.	.
L01-283	L94-428	472	23	79	7	86	.	.	.	.
L01-283	L99-226	313	5	52	1	61	1	75	.	.
L01-283	L99-233	788	48	86	18	96	13	98	.	.
L01-283	L99-233	693	32	76	11	89	5	91	.	.
L01-283	L99-233	435	27	88	7	90	.	.	.	.
L01-299	09P1	603	0	23	0	28	.	.	.	.
L01-299	09P3	718	69	95	10	84	.	.	.	.
L01-299	09P4	578	41	92	11	94	.	.	.	.
L01-299	09P7	331	9	62	6	92	4	97	.	.
L01-299	TUCCP77-042	192	12	89	3	88	1	85	.	.
L01-315	HOCP96-540	416	12	63	0	28	0	33	.	.
L05-448	L01-283	386	20	80	3	75	1	73	.	.
L05-457	HO01-564	301	0	23	0	28	0	33	.	.
L05-457	HOCP02-623	158	0	23	0	28	0	33	.	.
L05-457	HOCP91-552	154	0	23	0	28	0	33	.	.
L05-457	HOCP96-540	635	7	51	3	67	1	68	.	.
L05-457	L01-283	521	8	52	2	63	0	33	.	.
L05-457	L01-283	401	9	56	3	74	1	71	.	.
L05-457	L01-283	1206	137	96	40	98	.	.	.	.
L05-457	L01-299	188	0	23	0	28	0	33	.	.
L05-457	L06-038	194	0	23	0	28	0	33	.	.
L05-457	L99-226	236	0	23	0	28	0	33	.	.
L05-457	L99-226	239	14	85	3	82	1	79	.	.
L05-457	L99-233	197	0	23	0	28	0	33	.	.
L06-001	L01-299	74	3	73	0	28	0	33	.	.
L08-078	HO05-961	229	0	23	0	28	0	33	.	.
L08-082	HOCP00-610	188	0	23	0	28	0	33	.	.
L08-082	HOCP96-540	352	12	67	3	76	0	33	.	.
L08-082	HOCP96-540	394	0	23	0	28	0	33	.	.
L08-082	LCP86-454	106	0	23	0	28	0	33	.	.
L08-090	L01-299	413	0	23	0	28	0	33	.	.
L08-094	L01-299	472	6	51	2	63	0	33	.	.
L08-094	L01-299	217	0	23	0	28	0	33	.	.
L08-095	HOCP00-930	215	0	23	0	28	0	33	.	.
L94-426	L06-001	192	0	23	0	28	0	33	.	.
L94-426	L06-001	1156	79	92	11	77	.	.	.	.
L94-426	L99-226	380	0	23	0	28	0	33	.	.
L94-426	L99-226	229	0	23	0	28	.	.	.	.

Table 6. Continue

			1 st Line		2 nd Line		Increases		Assignments	
Female	Male	Survive	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile
L94-428	L01-299	173	10	84	1	70	1	88	.	.
L94-432	L01-299	358	7	55	1	60	1	73	.	.
L94-433	HO05-961	184	0	23	0	28	0	33	.	.
L94-433	HOCP05-918	303	14	76	2	72	1	77	.	.
L94-433	L01-283	304	7	58	1	62	1	77	.	.
L94-433	L01-283	419	0	23	0	28	.	.	.	.
L94-433	L99-226	396	14	68	1	58	0	33	.	.
L97-128	09P17	197	7	69	3	87	1	84	.	.
L97-128	09P3	144	0	23	0	28	0	33	.	.
L97-128	HO01-564	220	8	69	1	65	1	80	.	.
L97-128	HOCP01-517	205	13	89	1	68	1	83	.	.
L97-128	L01-283	182	11	85	4	95	1	87	.	.
L97-128	L01-299	165	0	23	0	28	0	33	.	.
L97-128	L06-038	247	0	23	0	28	0	33	.	.
L97-128	L98-207	227	6	60	0	28	0	33	.	.
L97-128	L98-207	249	27	96	16	99	.	.	.	.
L97-128	L99-226	91	3	66	0	28	0	33	.	.
L97-128	L99-233	501	0	23	0	28	0	33	.	.
L98-207	HO05-961	334	12	69	0	28	0	33	.	.
L98-207	HOCP01-517	344	12	68	0	28	0	33	.	.
L98-207	L01-299	121	0	23	0	28	0	33	.	.
L98-207	TUCCP77-042	434	11	59	2	66	2	81	.	.
L98-209	L99-226	912	44	78	7	75	1	67	.	.
L98-209	L99-226	485	42	94	8	91	.	.	.	.
L99-226	09P4	392	0	23	0	28	.	.	.	.
L99-233	09P2	409	0	23	0	28	0	33	.	.
L99-233	HOCP96-540	506	59	97	8	89	5	94	.	.
L99-233	L08-093	180	1	49	0	28	0	33	.	.
L99-233	L99-226	944	35	70	11	80	6	89	.	.
LCP81-010	HOCP96-540	386	7	53	0	28	0	33	.	.
LCP81-010	L01-299	325	0	23	0	28	0	33	.	.
LCP81-010	L06-001	310	0	23	0	28	0	33	.	.
LCP81-010	L06-038	341	13	71	3	76	1	74	.	.
LCP81-010	L99-226	344	19	82	5	86	0	33	.	.
LCP81-010	L99-226	229	15	91	1	64	0	33	.	.
LCP81-010	L99-233	239	0	23	0	28	0	33	.	.
LCP85-384	HOCP96-540	634	26	73	1	56	0	33	.	.
LCP85-384	HOCP96-540	324	0	23	0	28	0	33	.	.
LCP85-384	L01-299	1253	0	23	0	28	0	33	.	.
N-27	L94-428	204	0	23	0	28	0	33	.	.
N-27	L94-432	211	0	23	0	28	0	33	.	.
N-27	L99-226	213	0	23	0	28	0	33	.	.
N-27	L99-226	392	18	76	1	59	0	33	.	.
TUCCP77-042	L01-283	169	9	80	3	91	3	99	.	.
US01-040	HOCP97-609	216	26	98	1	66	0	33	.	.

Table 6. Continue

			1 st. Line		2 nd Line		Increases		Assignments	
Female	Male	Survive	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile
2010 Crossing Series										
CP83-644	HOCP85-845	328	6	39	2	73	.	.	.	.
CP83-644	L94-428	521	7	34	0	30	.	.	.	.
CP83-644	L99-233	304	13	69	3	80	.	.	.	.
HO06-530	10P26	212	6	49	0	30	.	.	.	.
HO06-563	10P24	240	0	10	0	30	.	.	.	.
HO07-613	10P21	149	0	10	0	30	.	.	.	.
HO08-709	10P6	495	15	51	0	30	.	.	.	.
HO95-988	10P7	484	30	80	0	30	.	.	.	.
HO95-988	10P9	443	8	39	0	30	.	.	.	.
HOCP00-930	10P18	928	26	49	0	30	.	.	.	.
HOCP00-930	HO95-988	166	0	10	0	30	.	.	.	.
HOCP00-930	L06-001	214	8	60	1	69	.	.	.	.
HOCP00-930	L06-038	189	27	98	1	70	.	.	.	.
HOCP00-930	L94-428	250	18	85	0	30	.	.	.	.
HOCP00-930	L98-207	228	3	34	0	30	.	.	.	.
HOCP00-930	L99-226	131	4	52	0	30	.	.	.	.
HOCP00-930	L99-226	172	0	10	0	30	.	.	.	.
HOCP00-950	10P36	678	9	34	0	30	.	.	.	.
HOCP00-950	L99-226	2127	33	37	0	30	.	.	.	.
HOCP01-517	10P12	242	7	50	4	87	.	.	.	.
HOCP01-523	L99-226	89	4	70	0	30	.	.	.	.
HOCP02-618	10P12	178	16	90	0	30	.	.	.	.
HOCP02-623	10P24	324	12	60	0	30	.	.	.	.
HOCP02-623	10P29	674	3	21	0	30	.	.	.	.
HOCP02-623	10P5	180	5	49	0	30	.	.	.	.
HOCP04-838	10P2	117	2	37	1	78	.	.	.	.
HOCP04-838	HOCP02-623	170	6	56	0	30	.	.	.	.
HOCP04-838	L06-001	170	6	56	0	30	.	.	.	.
HOCP05-902	10P34	440	15	54	0	30	.	.	.	.
HOCP85-845	10P10	488	39	88	3	73	.	.	.	.
HOCP85-845	10P11	650	6	28	0	30	.	.	.	.
HOCP85-845	10P13	129	9	83	0	30	.	.	.	.
HOCP85-845	10P28	415	18	69	0	30	.	.	.	.
HOCP85-845	L99-233	136	0	10	0	30	.	.	.	.
HOCP91-552	10P12	421	5	32	0	30	.	.	.	.
HOCP91-552	10P13	348	0	10	0	30	.	.	.	.
HOCP91-552	10P14	210	5	44	5	94	.	.	.	.
HOCP91-552	10P2	64	0	10	0	30	.	.	.	.
HOCP91-552	HOCP02-623	396	0	10	0	30	.	.	.	.
HOCP91-552	L05-448	181	9	74	1	71	.	.	.	.
HOCP91-552	L07-057	232	7	51	0	30	.	.	.	.
HOCP91-552	L09-107	694	0	10	0	30	.	.	.	.
HOCP92-618	10P12	173	6	56	1	71	.	.	.	.
HOCP92-624	10P1	244	10	66	1	65	.	.	.	.
HOCP92-624	10P11	1095	20	39	1	61	.	.	.	.
HOCP92-624	10P21	304	13	69	0	30	.	.	.	.

Table 6. Continue

			1 st Line		2 nd Line		Increases		Assignments	
Female	Male	Survive	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile
HOCP92-624	10P3	385	14	58	3	76	.	.	.	.
HOCP92-624	HO08-706	166	6	58	1	72	.	.	.	.
HOCP92-624	HO95-988	701	26	60	0	30	.	.	.	.
HOCP92-624	HOCP04-838	950	0	10	0	30	.	.	.	.
HOCP92-624	L01-299	153	0	10	0	30	.	.	.	.
HOCP92-624	L05-448	220	12	78	0	30	.	.	.	.
HOCP92-624	L05-448	489	20	66	0	30	.	.	.	.
HOCP92-624	L07-057	216	23	95	3	86	.	.	.	.
HOCP92-624	L07-057	385	18	71	7	89	.	.	.	.
HOCP92-624	L08-090	229	22	92	4	88	.	.	.	.
HOCP92-624	L09-106	205	24	96	7	98	.	.	.	.
HOCP92-624	L99-226	1199	87	85	24	91	.	.	.	.
HOCP92-624	L99-226	892	23	47	0	30	.	.	.	.
HOCP92-624	L99-233	369	19	75	0	30	.	.	.	.
HOCP92-624	L99-233	551	23	67	10	89	.	.	.	.
HOCP92-624	LCP86-454	182	0	10	0	30	.	.	.	.
HOCP92-648	L99-233	212	20	91	5	93	.	.	.	.
HOCP95-951	10P5	413	5	32	3	75	.	.	.	.
HOCP95-951	10P6	606	14	43	4	74	.	.	.	.
HOCP96-540	10P10	893	12	34	0	30	.	.	.	.
HOCP96-540	10P11	1117	0	10	0	30	.	.	.	.
HOCP96-540	10P12	188	10	77	2	82	.	.	.	.
HOCP96-540	10P15	1217	0	10	0	30	.	.	.	.
HOCP96-540	10P17	206	8	64	4	90	.	.	.	.
HOCP96-540	10P18	225	0	10	0	30	.	.	.	.
HOCP96-540	10P19	446	0	10	0	30	.	.	.	.
HOL08-720	L99-233	87	0	10	0	30	.	.	.	.
L01-283	10P29	478	4	26	0	30	.	.	.	.
L01-283	10P30	635	0	10	0	30	.	.	.	.
L01-283	10P32	1114	0	10	0	30	.	.	.	.
L01-283	10P34	194	19	92	2	81	.	.	.	.
L01-299	10P10	242	15	80	6	95	.	.	.	.
L01-299	10P11	383	10	47	0	30	.	.	.	.
L01-299	10P17	234	0	10	0	30	.	.	.	.
L01-299	10P38	148	0	10	0	30	.	.	.	.
L01-299	10P38	472	57	97	20	99	.	.	.	.
L01-299	10P9	157	13	89	3	90	.	.	.	.
L01-315	10P12	238	3	34	0	30	.	.	.	.
L01-315	L99-233	226	9	64	5	93	.	.	.	.
L05-457	10P13	187	0	10	0	30	.	.	.	.
L05-457	10P3	206	10	73	0	30	.	.	.	.
L05-457	HO95-988	192	10	76	2	82	.	.	.	.
L05-457	HOCP04-838	248	5	41	0	30	.	.	.	.
L05-457	L07-057	135	5	60	0	30	.	.	.	.
L05-457	L08-090	243	14	79	2	77	.	.	.	.
L05-457	L09-106	230	25	96	0	30	.	.	.	.
L05-457	L99-226	516	27	76	2	64	.	.	.	.

Table 6. Continue

			1 st Line		2 nd Line		Increases		Assignments	
Female	Male	Survive	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile
L05-457	L99-233	210	9	69	2	79	.	.	.	.
L06-001	10P17	138	7	75	1	75	.	.	.	.
L06-001	L99-226	123	4	53	0	30	.	.	.	.
L07-057	10P1	193	9	71	4	92	.	.	.	.
L08-090	10P11	955	24	46	0	30	.	.	.	.
L08-090	10P16	163	8	73	2	84	.	.	.	.
L09-099	10P17	304	11	58	4	85	.	.	.	.
L09-118	10P31	383	0	10	0	30	.	.	.	.
L09-123	10P12	219	3	36	0	30	.	.	.	.
L09-123	10P6	122	3	46	1	77	.	.	.	.
L09-123	10P9	225	16	84	0	30	.	.	.	.
L09-125	L01-299	209	8	63	1	70	.	.	.	.
L09-130	10P9	231	16	82	1	66	.	.	.	.
L94-428	LCP85-384	243	26	95	1	65	.	.	.	.
L94-432	10P11	238	29	98	2	78	.	.	.	.
L94-432	10P13	188	10	77	4	92	.	.	.	.
L94-432	10P15	143	0	10	0	30	.	.	.	.
L94-432	10P27	203	17	89	6	96	.	.	.	.
L94-432	10P28	1004	105	94	38	98	.	.	.	.
L94-432	10P31	226	0	10	0	30	.	.	.	.
L97-128	10P6	225	9	64	1	67	.	.	.	.
L97-128	HOCP95-951	219	15	82	1	68	.	.	.	.
L97-128	L06-001	164	25	99	5	97	.	.	.	.
L97-128	L99-226	137	1	24	0	30	.	.	.	.
L98-207	10P27	198	0	10	0	30	.	.	.	.
L98-207	10P6	365	2	22	0	30	.	.	.	.
L98-207	10P9	235	9	63	4	87	.	.	.	.
L98-207	LCP81-010	172	4	43	0	30	.	.	.	.
L98-209	10P5	236	13	78	6	95	.	.	.	.
L98-209	HOCP95-951	403	4	30	0	30	.	.	.	.
L99-226	HO08-706	245	9	60	3	83	.	.	.	.
L99-226	L01-299	116	4	54	0	30	.	.	.	.
L99-226	L06-038	152	12	87	2	85	.	.	.	.
L99-226	L06-038	613	5	26	2	63	.	.	.	.
L99-226	L99-233	557	18	53	0	30	.	.	.	.
L99-233	10P11	797	7	28	0	30	.	.	.	.
L99-233	10P12	597	0	10	0	30	.	.	.	.
L99-233	10P2	146	0	10	0	30	.	.	.	.
L99-233	10P3	143	11	86	4	96	.	.	.	.
L99-233	HOCP04-838	224	23	93	1	68	.	.	.	.
LCP81-010	10P12	334	2	23	0	30	.	.	.	.
LCP81-010	10P14	287	7	44	0	30	.	.	.	.
LCP81-010	10P4	132	1	26	0	30	.	.	.	.
LCP81-010	HO06-530	222	4	39	0	30	.	.	.	.
LCP81-010	HO07-613	213	0	10	0	30	.	.	.	.
LCP81-010	HO08-706	287	0	10	0	30	.	.	.	.
LCP81-010	HO08-706	389	4	30	0	30	.	.	.	.

Table 6. Continue

			1 st Line		2 nd Line		Increases		Assignments	
Female	Male	Survive	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile
LCP81-010	HOCP01-523	127	13	93	0	30	.	.	.	.
LCP81-010	L01-299	937	5	22	0	30	.	.	.	.
LCP85-384	10P17	295	6	41	0	30	.	.	.	.
LCP85-384	10P18	197	8	66	2	81	.	.	.	.
LCP85-384	10P19	208	7	54	0	30	.	.	.	.
LCP85-384	10P20	858	9	30	0	30	.	.	.	.
LCP85-384	10P24	443	28	81	4	79	.	.	.	.
LCP85-384	10P28	146	7	72	2	85	.	.	.	.
LCP85-384	10P31	604	0	10	0	30	.	.	.	.
LCP85-384	10P32	425	0	10	0	30	.	.	.	.
LCP85-384	10P4	252	22	90	1	64	.	.	.	.
LCP85-384	10P7	232	18	87	0	30	.	.	.	.
LCP85-384	10P8	159	4	46	0	30	.	.	.	.
LCP86-454	10P9	844	7	26	0	30	.	.	.	.
N27	10P35	347	3	28	0	30	.	.	.	.
N27	10P7	932	5	22	1	62	.	.	.	.
N27	10P8	1614	0	10	0	30	.	.	.	.
N27	HO08-706	876	19	42	1	62	.	.	.	.
N27	HOCP96-540	1635	12	24	0	30	.	.	.	.
N27	L06-001	225	16	84	1	67	.	.	.	.
N27	L94-426	368	0	10	0	30	.	.	.	.
N27	L99-226	829	16	40	0	30	.	.	.	.
TUCCP77-042	10P37	456	6	34	0	30	.	.	.	.
2011 Crossing Series										
CP83-644	11P35	273	0	9	.	.	.	.	.	.
CP83-644	11P36	198	1	26	.	.	.	.	.	.
CP83-644	L01-283	186	7	68	.	.	.	.	.	.
HO06-563	11P11	385	16	72	.	.	.	.	.	.
HO06-563	11P28	495	3	27	.	.	.	.	.	.
HO06-563	11P29	484	20	72	.	.	.	.	.	.
HO07-613	L99-226	164	0	9	.	.	.	.	.	.
HO08-709	LCP86-454	700	46	89	.	.	.	.	.	.
HO08-717	11P22	223	6	54	.	.	.	.	.	.
HO08-717	11P23	381	11	57	.	.	.	.	.	.
HO08-717	11P26	222	3	38	.	.	.	.	.	.
HO08-717	11P32	488	0	9	.	.	.	.	.	.
HO08-717	L09-131	219	16	94	.	.	.	.	.	.
HO09-824	11P33	234	23	98	.	.	.	.	.	.
HO09-827	L07-057	738	27	66	.	.	.	.	.	.
HO09-827	LCP85-384	170	4	51	.	.	.	.	.	.
HO09-841	11P7	162	21	99	.	.	.	.	.	.
HO09-841	11P9	227	5	50	.	.	.	.	.	.
HO95-988	11P15	715	21	57	.	.	.	.	.	.
HO95-988	11P16	653	19	57	.	.	.	.	.	.
HO95-988	11P17	477	2	22	.	.	.	.	.	.

Table 6. Continue

			1 st Line		2 nd Line		Increases		Assignments	
Female	Male	Survive	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile
HO95-988	L09-125	251	14	83	.	.	.	.	.	.
HOCP00-930	11P26	813	50	88	.	.	.	.	.	.
HOCP00-930	HOCP96-561	485	0	9	.	.	.	.	.	.
HOCP00-930	L10-147	241	5	48	.	.	.	.	.	.
HOCP00-930	L99-226	692	13	46	.	.	.	.	.	.
HOCP00-950	11P13	535	7	35	.	.	.	.	.	.
HOCP00-950	11P33	251	10	70	.	.	.	.	.	.
HOCP01-517	11P22	648	24	66	.	.	.	.	.	.
HOCP01-517	L01-283	244	2	30	.	.	.	.	.	.
HOCP01-523	HOCP96-540	250	10	70	.	.	.	.	.	.
HOCP01-523	HOCP96-561	360	22	87	.	.	.	.	.	.
HOCP01-523	LCP85-384	1185	43	64	.	.	.	.	.	.
HOCP02-618	11P13	478	0	9	.	.	.	.	.	.
HOCP02-618	11P22	439	47	98	.	.	.	.	.	.
HOCP02-618	11P29	221	8	64	.	.	.	.	.	.
HOCP02-623	11P17	192	6	59	.	.	.	.	.	.
HOCP02-623	11P18	251	2	30	.	.	.	.	.	.
HOCP02-623	11P19	949	15	40	.	.	.	.	.	.
HOCP02-623	L06-001	476	15	60	.	.	.	.	.	.
HOCP04-838	11P10	429	0	9	.	.	.	.	.	.
HOCP04-838	11P18	933	4	22	.	.	.	.	.	.
HOCP04-838	11P20	440	29	89	.	.	.	.	.	.
HOCP04-838	HOCP95-951	220	3	38	.	.	.	.	.	.
HOCP04-838	L07-057	548	9	40	.	.	.	.	.	.
HOCP04-838	L08-090	926	62	90	.	.	.	.	.	.
HOCP04-838	L08-090	396	10	52	.	.	.	.	.	.
HOCP04-847	11P19	250	4	40	.	.	.	.	.	.
HOCP08-726	11P24	686	34	80	.	.	.	.	.	.
HOCP08-726	L06-001	131	0	9	.	.	.	.	.	.
HOCP08-726	L08-090	145	4	55	.	.	.	.	.	.
HOCP08-726	L99-233	501	23	77	.	.	.	.	.	.
HOCP09-803	HOCP96-540	168	1	27	.	.	.	.	.	.
HOCP09-810	11P22	686	17	52	.	.	.	.	.	.
HOCP09-846	11P23	245	15	87	.	.	.	.	.	.
HOCP09-846	11P9	206	9	74	.	.	.	.	.	.
HOCP85-845	11P10	492	34	92	.	.	.	.	.	.
HOCP85-845	11P16	677	9	35	.	.	.	.	.	.
HOCP85-845	11P17	818	3	22	.	.	.	.	.	.
HOCP85-845	11P18	667	8	33	.	.	.	.	.	.
HOCP85-845	11P19	263	4	38	.	.	.	.	.	.
HOCP85-845	11P24	255	0	9	.	.	.	.	.	.
HOCP85-845	11P33	710	34	79	.	.	.	.	.	.
HOCP85-845	L01-283	57	1	44	.	.	.	.	.	.
HOCP85-845	L10-160	378	2	26	.	.	.	.	.	.
HOCP91-552	HOCP04-838	210	0	9	.	.	.	.	.	.
HOCP91-552	L01-299	881	0	9	.	.	.	.	.	.
HOCP92-618	11P33	225	4	44	.	.	.	.	.	.

Table 6. Continue

			1 st Line		2 nd Line		Increases		Assignments	
Female	Male	Survive	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile
HOCP92-618	L06-001	702	1	18	.	.	.	.	.	.
HOCP92-624	11P3	372	18	79	.	.	.	.	.	.
HOCP92-624	HOCP01-523	433	30	92	.	.	.	.	.	.
HOCP92-624	L05-457	448	15	62	.	.	.	.	.	.
HOCP92-624	L08-090	411	19	77	.	.	.	.	.	.
HOCP92-624	L09-125	1173	53	75	.	.	.	.	.	.
HOCP95-951	L09-099	234	9	68	.	.	.	.	.	.
HOCP97-609	11P10	488	39	96	.	.	.	.	.	.
HOCP97-609	11P15	699	38	82	.	.	.	.	.	.
HOCP97-609	11P18	212	12	85	.	.	.	.	.	.
HOCP97-609	11P19	547	7	35	.	.	.	.	.	.
HOL08-723	11P25	419	14	62	.	.	.	.	.	.
HOL08-723	L01-283	215	8	66	.	.	.	.	.	.
L01-283	11P33	231	1	22	.	.	.	.	.	.
L01-299	11P26	475	32	90	.	.	.	.	.	.
L01-299	11P27	500	23	77	.	.	.	.	.	.
L01-315	11P7	223	6	54	.	.	.	.	.	.
L01-315	L99-233	754	0	9	.	.	.	.	.	.
L05-448	11P28	235	3	35	.	.	.	.	.	.
L05-448	11P5	215	1	26	.	.	.	.	.	.
L06-001	11P17	231	13	83	.	.	.	.	.	.
L06-040	11P25	475	1	19	.	.	.	.	.	.
L06-040	L05-448	151	6	70	.	.	.	.	.	.
L06-040	L99-233	208	8	68	.	.	.	.	.	.
L07-057	11P20	486	14	57	.	.	.	.	.	.
L08-088	11P28	230	1	22	.	.	.	.	.	.
L08-090	11P2	583	40	92	.	.	.	.	.	.
L08-090	11P3	642	32	80	.	.	.	.	.	.
L09-099	11P16	612	0	9	.	.	.	.	.	.
L09-099	L01-283	445	36	97	.	.	.	.	.	.
L09-099	L06-001	685	33	79	.	.	.	.	.	.
L09-099	L10-163	228	18	96	.	.	.	.	.	.
L09-099	L99-233	235	0	9	.	.	.	.	.	.
L09-107	11P27	116	0	9	.	.	.	.	.	.
L09-107	L09-125	485	8	40	.	.	.	.	.	.
L09-108	HOCP01-523	728	13	44	.	.	.	.	.	.
L09-108	HOCP92-618	452	0	9	.	.	.	.	.	.
L09-121	L98-207	762	0	9	.	.	.	.	.	.
L09-121	L99-226	138	4	57	.	.	.	.	.	.
L09-123	HOCP96-540	225	4	44	.	.	.	.	.	.
L09-123	L99-233	137	3	50	.	.	.	.	.	.
L10-132	11P2	195	5	53	.	.	.	.	.	.
L10-132	11P3	203	0	9	.	.	.	.	.	.
L10-147	HOCP96-540	680	5	29	.	.	.	.	.	.
L94-426	11P14	233	3	35	.	.	.	.	.	.
L94-426	11P15	386	0	9	.	.	.	.	.	.
L94-426	HOCP96-561	180	13	94	.	.	.	.	.	.

Table 6. Continue

			1 st Line		2 nd Line		Increases		Assignments	
Female	Male	Survive	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile	No	Rank Percentile
L94-426	L06-001	202	14	92	.	.	.	.	.	.
L94-426	L99-226	185	0	9	.	.	.	.	.	.
L94-428	11P11	684	20	57	.	.	.	.	.	.
L94-433	11P11	498	6	33	.	.	.	.	.	.
L94-433	11P14	485	16	62	.	.	.	.	.	.
L94-433	HOCP96-540	699	3	22	.	.	.	.	.	.
L98-207	11P15	543	0	9	.	.	.	.	.	.
L98-207	11P19	669	12	44	.	.	.	.	.	.
L99-223	11P22	705	15	48	.	.	.	.	.	.
L99-226	11P13	514	0	9	.	.	.	.	.	.
L99-226	11P14	160	10	88	.	.	.	.	.	.
L99-226	11P15	239	1	22	.	.	.	.	.	.
L99-226	11P16	1292	16	33	.	.	.	.	.	.
L99-226	11P17	971	18	46	.	.	.	.	.	.
L99-233	11P2	334	7	48	.	.	.	.	.	.
L99-233	11P3	419	0	9	.	.	.	.	.	.
L99-233	11P4	634	0	9	.	.	.	.	.	.
LCP81-010	11P17	490	22	75	.	.	.	.	.	.
LCP81-010	11P28	700	0	9	.	.	.	.	.	.
LCP81-010	L10-132	952	72	95	.	.	.	.	.	.
LCP81-010	L99-226	1046	45	73	.	.	.	.	.	.
LCP85-384	11P10	691	5	29	.	.	.	.	.	.
LCP85-384	11P12	586	0	9	.	.	.	.	.	.
LCP85-384	11P15	575	0	9	.	.	.	.	.	.
LCP85-384	11P16	164	2	33	.	.	.	.	.	.
LCP85-384	11P17	696	40	85	.	.	.	.	.	.
LCP85-384	11P22	453	18	70	.	.	.	.	.	.
LCP85-384	11P25	224	10	75	.	.	.	.	.	.
LCP85-384	11P28	688	40	86	.	.	.	.	.	.
LCP85-384	11P31	850	8	31	.	.	.	.	.	.
LCP85-384	11P33	434	24	83	.	.	.	.	.	.
LCP85-384	L10-160	228	8	63	.	.	.	.	.	.
LCP85-384	L99-226	334	0	9	.	.	.	.	.	.
N27	L10-144	115	0	9	.	.	.	.	.	.
N27	L10-163	158	6	68	.	.	.	.	.	.
N27	L99-226	695	22	60	.	.	.	.	.	.
N27	L99-233	632	10	40	.	.	.	.	.	.
US79-010	11P14	549	0	9	.	.	.	.	.	.
US79-010	11P17	230	5	50	.	.	.	.	.	.
US79-010	11P30	192	10	81	.	.	.	.	.	.
US79-010	11P31	976	4	22	.	.	.	.	.	.
US79-010	L05-448	717	2	20	.	.	.	.	.	.
US79-010	L99-226	1126	21	46	.	.	.	.	.	.

2013 LOUISIANA SUGARCANE VARIETY DEVELOPMENT PROGRAM NURSERY AND INFIELD VARIETY TRIALS

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Five years after the initial hybridization of parents, clones that have met or exceeded criteria for desired characteristics at previous selection stages are assigned permanent numbers by each of the Louisiana Sugarcane Variety Development Programs. The LSU program assigns variety designations of "L," and the USDA program assigns variety designations of "Ho" and "HoCP." These varieties are planted in replicated nursery and infield tests at locations across the southern Louisiana sugarcane-growing areas.

One objective of the nursery and infield stages is to identify and select varieties that will perform well across the range of environments a commercial variety will encounter in Louisiana. Nursery tests are initially planted at three on-station locations (USDA-ARS - Ardoyne Farm, Iberia Research Station, and Sugar Research Station) during the year of assignment, and four to five additional and different off-station locations are planted the year after assignment. The off-station nurseries are Newton Cane, Inc. (Bunkie), Michael Melancon (Cecilia), and Landry Farms (Paincourtville), along with the two infield trial locations at Blackberry Farms (Vacherie), Sugarland Acres, Inc. (Youngsville) and Donnie Vallot (Erath). Both the LSU and USDA varieties were planted at each location. The locations, soil types, dates of planting and dates of harvest are listed in Table 1.

The on-station nursery trials were planted in single row (6-foot centers), 16-foot-long plots with 4-foot alleys. The off-station nurseries were planted in single row, 20-foot plots with 4-foot alleys. The infield tests were planted in two-row, 25-foot plots with 5-foot alleys. The experimental design for both nursery and infield tests was a randomized complete block with two replications per location. Five commercial check varieties, HoCP96-540, L99-226, L01-299, L01-283, and HoCP04-838 were planted in all nursery and infield tests for comparison.

Millable stalk counts for both nursery and infield tests were made in late July and August. A combine harvester and weigh wagon system was used to cut and weigh plots, respectively, for the infield tests. At harvest, 10-stalk samples were harvested by hand and stripped of leaves. A bundle weight was recorded to obtain a stalk weight (lb) estimate. Samples were then analyzed for sucrose content and fiber content. At the USDA-ARS laboratory, the pre-breaker press method was used to estimate fiber content. A juice sample was sent to the laboratory to obtain Brix and pol readings, which were used to estimate theoretical recoverable sugar per ton as estimated by the Winter-Carp formula as reported by Gravois and Milligan (1992). Samples sent to the Sugar Research Station sucrose laboratory were analyzed with a NIR Spectra Cane system to estimate sucrose and fiber content. Cane yield for the nursery tests was estimated as the product of stalk weight and stalk number. Cane yield for the infield tests was determined from the plot weights and reduced 14 percent to account for extraneous trash. Sugar per acre was calculated as the product of sugar per ton and cane yield.

The 2013 sugarcane crop experienced a normal range of growing conditions. The planting season had average rainfall and all experiments were planted in a timely manner. The crop did experience a freeze in late November 2013. Although there were several experiments harvested after the freeze they were not affected because temperatures remained cool. The majority of the Louisiana crop was harvested by the end of December. Recommended cultural practices were followed at all test locations.

The leading variety grown in Louisiana in 2013 was HoCP96-540, which occupied 37% of the state's sugarcane acreage. Therefore, HoCP96-540 was used as a standard for comparison and is highlighted in the tables. To adjust for missing data, the statistical analysis calculated least square means (SAS 9 Proc Mixed). Mean separation used least square means probability differences where P=0.05. Varieties that are significantly higher or lower than HoCP96-540 are denoted by a plus (+) or minus (-), respectively, next to the value for each trait.

References:

Gravois, K.A. and S.B. Milligan. 1992. Genetic relationships between fiber and sugarcane yield components. Crop Sci. 32: 62-66.

Table 1. 2013 Location, soil texture, and planting and harvest dates for the nursery and infield tests.

					Harvest Date	Varieties	
Series	Location†	Stage	Soil Texture	Planting Date	2013	No. Planted	No. Harvested
2009	Blackberry Farms	Infield	Commerce silt loam	09/10/10	11/12/13	21	1
2009	Sugarland Acres, Inc.	Infield	Coteau silt loam	08/25/10	**	21	
2009	Newton Cane, Inc.	Nursery	Norwood silt loam	08/26/10	10/29/13	43	3
2009	Michael Melancon	Nursery	Loreauville silt loam	08/27/10	10/14/13	43	3
2009	Landry Farms	Nursery	Commerce silt loam	09/15/10	10/15/13	43	3
2010	Sugar Research Station	Nursery	Commerce silt loam	10/14/10	11/12/13	34	1
2010	Ardoyne Farm – U.S.D.A	Nursery	Commerce silt loam	10/13/10	11/07/13	34	1
2010	Iberia Research Station	Nursery	Baldwin silty clay	10/21/10	11/15/13	34	1
2010	Blackberry Farms	Infield	Commerce silt loam	08/26/11	11/12/13	21	3
2010	Donnie Vallot Farm	Infield	Patoutville silt loam	09/22/11	12/09/13	21	3
2010	Newton Cane, Inc.	Nursery	Norwood silt loam	08/24/11	10/29/13	28	2
2010	Michael Melancon	Nursery	Loreauville silt loam	08/18/11	10/24/13	28	2
2010	Landry Farms	Nursery	Commerce silt loam	08/29/11	10/15/13	28	2
2011	Sugar Research Station	Nursery	Commerce silt loam	10/13/11	11/20/13	25	5
2011	Ardoyne Farm – U.S.D.A	Nursery	Commerce silt loam	10/17/11	12/11/13	25	5
2011	Iberia Research Station	Nursery	Baldwin silty clay	10/21/11	11/15/13	25	5
2011	Donnie Vallot Farms	Infield	Patoutville silt loam	09/10/12	12/09/13	13	6
2011	Blackberry Farms	Infield	Commerce silt loam	08/17/12	11/12/13	13	6
2011	Newton Cane, Inc.	Nursery	Norwood silt loam	08/22/12	12/02/13	54	15
2011	Michael Melancon	Nursery	Loreauville silt loam	09/11/12	12/02/13	54	15
2011	Landry Farms	Nursery	Sharkey silty clay loam	09/27/12	12/09/13	54	15
2012	Sugar Research Station	Nursery	Commerce silt loam	10/25/12	12/04/13	40	11
2012	Ardoyne Farm – U.S.D.A.	Nursery	Commerce silt loam	11/02/12	12/11/13	40	11
2012	Iberia Research Station	Nursery	Baldwin silty clay	10/23/12	11/15/13	40	11
2012	Blackberry Farms	Infield	Commerce silt loam	08/30/13		21	
2012	Donnie Vallot Farms	Infield	Patoutville silt loam	09/03/13		21	
2012	Newton Cane, Inc	Nursery	Norwood silt loam	08/27/13		58	
2012	Michael Melancon	Nursery	Loreauville silt loam	08/20/13		58	
2012	Landry Farms	Nursery	Sharkey siltry clay	08/22/13		58	
2013	Sugar Research Station	Nursery	Commerce silt loam	10/29/13		30	
2013	Ardoyne Farm – U.S.D.A.	Nursery	Commerce silt loam	10/31/13		30	
2013	Iberia Research Station	Nursery	Baldwin silty clay	11/06/13		30	

† Ardoyne-U.S.D.A. Ardoyne Farm (Chacahoula), Blackberry Farms (Vacherie), Iberia Research Station (Jeanerette), Newton Cane, Inc. (Bunkie), Sugar Research Station (St. Gabriel), Michael Melancon (Cecilia), Sugarland Acres Inc. (Youngsville), Donnie Vallot Farm (Erath), Landry Farms (Paincourtville).

** Not Harvested

Table 2. Infield second-stubble means of the 2009 “L” assignment series on a Commerce silt loam soil at Blackberry Farms in Vacherie, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	7904	33.1	238	2.21	30611	13.2
L 99-226	9141	32.9	278 +	2.53	26023	13.7
L 99-233	11593 +	47.9 +	242	1.92	50037 +	15.6 +
L 01-283	9646	35.5	272 +	1.53 -	46458 +	12.3
L01-299	13254 +	56.6 +	234	2.08	54844 +	13.8
L 09-112	11309 +	47.5 +	239	2.26	42533	13.3

Table 3. Nursery second-stubble means of the 2009 “Ho” and “L” assignment series on a, Baldwin silty clay soil at Melancon Farms in Henderson, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	9701	38.8	253	1.90	41019	11.5
L 99-226	10713	40.4	266	2.53 +	31944	12.1
L 99-233	10225	37.9	270	1.91	40112	13.9 +
L 01-283	11105	43.3	257	1.66	52091 +	11.1
L 01-299	11097	42.6	262	1.72	49368	12.5
L 09-112	12625 +	52.7	241	2.35 +	45012	12.4
HoCP 09-804	12925 +	46.1	281	1.36 -	68063 +	14.4 +
Ho 09-840	8100	35.5	229	1.33 -	53361 +	11.9

Table 4. Nursery second-stubble means of the 2009 “Ho” and “L” assignment series on a Moreland silt loam soil at Newton Cane, Inc. in Bunkie, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	6013	31.1	195	1.48	41019	9.2
L 99-226	11034	44.4	248 +	2.18 +	40656	11.3 +
L 99-233	10342	48.7	211	1.75	55539	13.1 +
L 01-283	10764	47.8	223 +	1.83	52091	10.4 +
L 01-299	9555	43.0	223 +	1.59	54269	12.6 +
L 09-112	11161	53.8	207	2.18 +	49187	12.0 +
HoCP 09-804	12912	51.7	251 +	1.33	77682 +	13.1 +
Ho 09-840	7555	39.0	193	1.31	59351 +	10.2

Table 5. Nursery second-stubble means of the 2009 “Ho” and “L” assignment series on a, Commerce silt loam soil at Landry Farms in Paincourtville, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	8866	40.3	222	2.06	39023	11.4
L 99-226	9968	43.0	231	2.50	33215	13.1 +
L 99-233	11905	51.8	230	1.78	58262 +	13.3 +
L 01-283	15337	62.8	243	1.67	75141 +	11.2
L 01-299	7426	35.7	208	1.25	66429 +	12.8
L 09-112	13364	58.2	230	2.25	52272	12.7 +
HoCP 09-804	13346	53.4	249	1.43	74234 +	13.5 +
Ho 09-840	9599	46.3	208	1.36	69152 +	11.3

Table 6. Infield first-stubble means of the 2009 “H”, “HoCP” and 2010 “L” assignment series on a Commerce silt loam soil at Blackberry Farms in Vacherie, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	8577	38.0	226	2.44	31490	12.5
L 99-226	8563	35.4	243	2.61	27325	13.0
L 01-299	9808	41.8	234	1.76 -	47534 +	12.4
L 03-371	8471	33.6	253	2.11	32004	10.7
HoCP 04-838	9554	41.3	232	2.2	37761	12.3
HoCP 09-804	10675 +	44.2 +	242	1.67 -	53253 +	13.4
Ho 09-840	8727	37.5	233	1.36 -	55181 +	11.9
L 10-147	10237 +	42.9 +	239	2.5	34643	11.7

Table 7. Infield first-stubble means of the 2009 “Ho”, “HoCP” and 2010 “L” assignment series on a Coteau silt loam soil at Donnie Vallot Farms in Erath, Louisiana in 2012.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	9576	39.1	244	2.45	31975	12.1
L 99-226	10738	39.0	276	2.78	28211	11.8
L 01-299	9891	40.0	248	1.45 -	55303 +	12.0
L 03-371	8858	33.4	266	2.05	32779	11.0 -
HoCP 04-838	7704	31.8	243	1.89 -	33755	12.4
HoCP 09-804	8850	35.1	252	1.46 -	48349 +	12.5
Ho 09-840	7623	30.4 -	251	1.57 -	38952	12.0
L 10-147	7583	28.8 -	263	2.21	26898	10.0 -

Table 8. Nursery first-stubble means of the 2010 “Ho” and “L” assignment series on a, Baldwin silty clay soil at Melancon Farms in Henderson, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	7946	28.2	283	1.77	31944	11.9
L 99-226	11234	37.6	299 +	2.26	33396	11.4
L 01-299	8299	28.0	296	1.78	31218	12.3
L 03-371	11266	39.9	283	1.72	46283 +	10.5
HoCP 04-838	9702	32.6	297	1.67	39023	12.8
L 10-147	11121	38.7	288	1.91	40475	10.1
Ho 10-937	8880	31.4	283	1.97	31944	11.3

Table 9. Nursery first-stubble means of the 2010 “Ho” and “L” assignment series on a Moreland silt loam soil at Newton Cane, Inc. in Bunkie, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	7472	34.5	215	1.96	35030	10.3
L 99-226	11500 +	48.7	236	2.57 +	37752	11.2
L 01-299	7937	38.5	206	1.61 -	47916	10.8
L 03-371	12059 +	47.7	252 +	2.14	43923	9.3
HoCP 04-838	11198 +	51.0	224	1.96	51002	11.1
L 10-147	11117 +	48.3	231	2.18	45012	9.5
Ho 10-937	11746 +	48.5	243 +	2.56 +	37752	11.0

Table 10. Nursery first-stubble means of the 2010 “Ho” and “L” assignment series on a Commerce silt loam soil at Landry Farms in Paincourtville, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	10677	44.2	242	2.13	41564	11.4
L 99-226	13276	52.7	252	2.51	41927	11.6
L 01-299	9130	44.5	206 -	1.66	55358	12.2
L 03-371	12339	48.3	256	1.79	53906	9.6 -
HoCP 04-838	8700	40.8	214 -	1.58	51546	12.7
L 10-147	12202	53.1	230	2.19	48824	10.4
Ho 10-937	8596	36.7	234	1.77	41564	11.8

Table 11. Infield plantcane means of the 2010 “Ho” and 2011 “L” assignment series on a Commerce silt loam soil at Blackberry Farms in Vacherie, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	9547	42.6	225	2.49	34206	11.9
L 99-226	11733 +	45.4	260	2.78	32798	13.1
L 01-299	9304	40.1	232	1.90 -	42284	13.4
L 03-371	11410	44.0	261	2.08	42944	12.8
Ho 10-937	12270 +	48.9	251	2.63	37224	12.3
L 11-168	11158	44.4	252	2.23	39805	14.1 +
L 11-172	11430	47.2	243	2.60	36305	13.9 +
L 11-183	12701 +	48.7	261	2.12	47375	11.7
L 11-187	11603 +	45.3	256	2.15	42819	13.4
L 11-191	12568 +	48.6	259	2.15	45163	10.0

Table 12. Infield plantcane means of the 2010 “Ho” and 2011 “L” assignment series on a Coteau silt loam soil at Donnie Vallot Farms in Erath, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	7277	31.2	233	2.53	24821	12.7
L 99-226	7869	29.8	264 +	2.35	25469	12.2
L 01-299	8452	37.0	229	1.66	44621 +	12.2
L 03-371	8644	34.3	253 +	1.93	35790 +	11.3
Ho 10-937	7662	33.5	229	2.27	29531	12.3
L 11-168	4983	21.8	230	2.1	20780	13.0
L 11-172	5610	25.2	224	2.46	20397	13.6
L 11-183	8204	33.8	243	2.68	25420	11.4
L 11-187	7396	30.1	246	2.25	27502	13.6
L 11-191	8623	34.0	253 +	2.06	33067	9.8 -

Table 13. Nursery plantcane means of the 2011 “Ho”, “HoCP” and “L” assignment series on a, Baldwin silty clay soil at Melancon Farms in Henderson, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	11597	45.1	255	2.65	33759	12.0
L 99-226	14446	52.1	278	2.96	35393	12.9
L 01-299	11940	45.4	263	2.36	38478	12.4
L 03-371	11741	44.5	264	2.49	35937	11.0
L 11-168	10087	38.8	260	2.09	37208	13.5 +
L 11-172	11362	43.0	264	2.77	31218	15.4 +
L 11-183	14573	54.5	267	2.43	45012 +	11.4
L 11-187	13134	49.5	266	2.31	42834 +	13.8 +
L 11-191	10714	42.6	252	1.83 -	46464 +	11.2
HoCP 11-504	10995	46.3	238	2.23	41564 +	12.6
Ho 11-511	14313	54.2	265	3.17	34122	13.7 +
Ho 11-512	16086	54.1	298 +	2.82	38297	11.7
Ho 11-515	13975	49.9	281	2.35	42471 +	12.0
Ho 11-529	11682	44.2	264	2.37	37389	13.3 +
Ho 11-532	11874	45.6	260	2.33	39204 +	13.2
HoCP 11-548	14041	52.1	269	2.63	39567 +	14.4 +
Ho 11-556	14293	53.2	269	2.43	43742 +	12.6
Ho 11-573	10566	36.8	287 +	2.11	35030	13.1
HoCP 11-576	11090	41.2	270	2.16	38115	13.8 +

Table 14. Nursery plantcane means of the 2011 “Ho”, “HoCP”, and “L” assignment series on a Moreland silt loam soil at Newton Cane, Inc. in Bunkie, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	8978	41.7	215	2.2	38297	-
L 99-226	11005	47.2	233 -	2.5	38660	-
L 01-299	9242	40.9	226	1.9	43923	-
L 03-371	12523 +	50.2	250 +	2.3	43560	-
L 11-168	10367	42.6	244 +	2.1	41201	-
L 11-172	8976	40.9	220	2.1	38297	-
L 11-183	13564 +	58.0 +	235 +	2.3	49913 +	-
L 11-187	9568	37.7	255 +	1.9	39204	-
L 11-191	9322	41.0	227	1.8	46464	-
HoCP 11-504	9889	47.4	209	2.2	42653	-
Ho 11-511	8545	36.2	237 +	2.2	32670	-
Ho 11-512	10951	45.4	241 +	2.3	39386	-
Ho 11-515	11409	50.9	224	2.1	48824 +	-
Ho 11-529	10080	42.4	237 +	1.8	46283	-
Ho 11-532	11148	47.9	234 +	2.1	45738	-
HoCP 11-548	9472	38.6	246 +	2.3	34485	-
Ho 11-556	9468	39.4	241 +	1.6	48098 +	-
Ho 11-573	7339	29.9	246 +	1.9	32126	-
HoCP 11-576	7089	32.9	215	1.9	35030	-

Table 15. Nursery plantcane means of the 2011 “Ho”, HoCP”, and “L” assignment series on a Commerce silt loam soil at Landry Farms in Paincourtville, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	8291	32.3	258	1.97	32670	11.5
L 99-226	12333 +	47.9	258	2.61 +	36663	12.2
L 01-299	8648	34.3	244	1.92	34122	12.3
L 03-371	7107	29.7	239	1.65	36119	9.4 -
L 11-168	10105	40.9	248	1.94	42108 +	12.7
L 11-172	7750	32.0	242	2.18	30129	12.7
L 11-183	9894	38.9	255	2.01	38660	11.2
L 11-187	12381 +	47.1	264	2.17	43379 +	12.4
L 11-191	11383	47.4	241	2.12	44831	9.4 -
HoCP 11-504	8802	37.6	235	2.10	35756	12.4
Ho 11-511	11528	44.9	259	2.87 +	31218	12.9 +
Ho 11-512	13689 +	49.9	275	2.61 +	38297	11.2
Ho 11-515	10194	40.1	257	2.00	39930	12.3
Ho 11-529	8449	35.1	244	1.60	42834 +	12.2
Ho 11-532	10031	39.2	256	1.91	41019 +	11.8
HoCP 11-548	9862	37.0	268	2.02	37208	13.6 +
Ho 11-556	12140 +	48.2	254	1.97	48642 +	11.8
Ho 11-573	10055	36.2	278	1.96	37026	12.8
HoCP 11-576	9228	35.4	262	1.91	36663	12.3

Table 16. Nursery second-stubble means of the 2010 “L” assignment series on a Commerce silt loam soil at U.S.D.A-Ardoyne Farm in Chacahoula, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	10267	41.1	249	2.14	38342	11.1
L 99-226	11474	42.8	269	2.52	34031	12.7
L 99-233	10322	39.0	264	1.54	50820	14.6
L 01-283	9321	38.3	242	1.53	50820	12.6
L 01-299	8191	33.1	245	1.53	41745	13.3
L 10-147	10836	42.4	258	1.99	42426	12.2

Table 17. Nursery second-stubble means of the 2010 “L” assignment series on a Commerce silt loam soil at Sugar Research Station in St. Gabriel, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	14509	61.0	238	2.05	59668	11.9
L 99-226	18399	68.6	267 +	2.94 +	46283	13.0
L 99-233	9687	37.8	257	1.58 -	48324	13.7 +
L 01-283	12059	47.1	256	1.88	50366	9.8 -
L 01-299	12688	51.5	247	1.60 -	64206	13.3
L 10-147	11631	46.7	250	2.33	40157	10.8

Table 18. Nursery second-stubble means of the 2010 “L” assignment series on a Baldwin silty clay soil at Iberia Research Station in Jeanerette, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber	
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)	
HoCP 96-540	14253	57.3	249	2.33	49686	13.0	14253
L 99-226	12781	47.1	272 +	2.26	41745	13.3	12781
L 99-233	9555	36.0	266 +	1.95	36527	14.3	9555
L 01-283	15161	60.1	253	2.06	58307	12.3	15161
L 01-299	14724	62.4	238	1.85	66248	13.5	14724
L 10-147	10651	41.0	260	2.21	36981	11.6	10651

Table 19. Nursery first-stubble means of the 2011 “L” assignment series on a Commerce silt loam soil at U.S.D.A-Ardoyne Farm in Chacahoula, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	10037	41.9	240	2.39	34712	11.9
L 99-226	12748	48.0	266	2.73	35166	14.3 +
L 01-299	13044	51.2	255	2.01	51047	13.9 +
L 03-371	12613	50.2	252	2.04	49232	12.5
HoCP 04-838	10271	39.2	261	1.99	39023	13.8 +
L 11-168	9867	38.3	258	2.14	36527	13.2 +
L 11-172	11738	46.9	251	2.54	37208	13.5 +
L 11-183	10023	40.5	247	2.16	39476	13.7 +
L 11-187	10562	40.9	258	2.20	37208	13.9 +
L 11-191	7740	31.9	243	1.50	42653	10.7 -

Table 20. Nursery first-stubble means of the 2011 "L" assignment series on a Baldwin silty clay soil at Iberia Research Station in Jeanerette, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	11032	43.9	250	2.21	39703	12.5
L 99-226	13503	51.1	264	2.53 +	40384	13.4
L 01-299	14912 +	59.1 +	252	2.12	55811 +	13.0
L 03-371	10865	42.2	258	2.09	40384	11.1 -
HoCP 04-838	12218	47.9	255	1.84 -	51954	13.0
L 11-168	10532	40.2	265	1.85 -	43560	13.4
L 11-172	8809	34.0	260	2.34	29040	13.3
L 11-183	14637	59.3 +	247	2.27	52181	11.8
L 11-187	11186	41.5	270	1.97 -	42426	13.2
L 11-191	7728	31.0	250	1.72 -	35619	10.3 -

Table 21. Nursery first-stubble means of the 2011 "L" assignment series on a Commerce silt loam soil at Sugar Research Station in St. Gabriel, Louisiana in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	11401	47.1	243	2.20	42879	11.1
L 99-226	14957	54.2	276	2.57	43106	12.2 +
L 01-299	10290	39.6	262	1.65	48324	13.8 +
L 03-371	15067	56.3	270	2.11	53316	11.5
HoCP 04-838	11959	43.9	273	1.77	49913	13.5 +
L 11-168	10183	38.5	265	2.12	36527	13.1 +
L 11-172	14989	53.8	279	2.40	44921	13.0 +
L 11-183	11629	42.1	276	2.24	36754	11.4
L 11-187	12001	44.3	272	1.88	47417	13.0 +
L 11-191	8748	33.3	263	1.79	37208	8.9 -

Table 22. Nursery plantcane means of the 2012 "L" assignment series on a Commerce silt loam soil at Sugar Research Station in St. Gabriel, Louisiana in 2013.

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP 96-540	10470	45.5	231	2.64	34485	11.5
L 99-226	15468 +	62.4 +	248	3.22	38796	13.2 +
L 01-299	14988 +	68.5 +	219	3.02	45148 +	13.2 +
L 03-371	18990 +	73.7 +	257	3.24	45375 +	10.9
L 12-193	9776	37.0	265 +	2.65	27906	12.5
L 12-197	10015	44.3	227	2.47	36073	11.6
L 12-198	9036	37.6	241	2.01 -	37661	12.5
L 12-199	9634	40.7	236	2.46	33578	13.3 +
L 12-201	12990	52.1	250	2.89	36073	11.4
L 12-202	10135	42.1	241	2.46	34258	12.7
L 12-218	11073	51.4	215	3.12	33578	14.6 +
L 12-227	10412	41.5	251	2.63	31763	13.5 +
L 12-229	8550	37.4	228	2.06	36073	12.6
L 12-230	9117	40.3	226	2.84	28359	10.9 -
L 12-232	10312	45.9	222	2.62	35166	13.0 +

Table 23. Nursery plantcane means of the 2012 "L" assignment series on a Commerce silt loam soil at U.S.D.A-Ardoyne Farm in Chacahoula, Louisiana in 2013.

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP 96-540	10584	45.0	236	3.15	28586	11.1
L 99-226	13316	53.9	248	3.31	32670	12.5 +
L 01-299	11692	51.4	226	2.89	34939	12.4
L 03-371	12755	52.6	243	2.68 -	39249	10.7
L 12-193	9636	35.0	275 +	2.37 -	29267	12.6 +
L 12-197	9866	39.7	249	2.26 -	35166	11.4
L 12-198	6705	27.0	248	2.03 -	26318	10.3
L 12-199	9541	38.2	250	2.52 -	30401	12.8 +
L 12-201	12111	49.5	245	3.12	31763	10.5
L 12-202	9186	35.9	256	2.43 -	29494	12.6 +
L 12-218	13238	60.2	219 -	3.15	38796	14.9 +
L 12-227	12307	51.0	242	3.75 +	27225	13.5 +
L 12-229	6049 -	26.3	231	2.27 -	23141	11.2
L 12-230	8897	40.2	222	2.65 -	30401	10.2
L 12-232	8004	33.5	239	2.44 -	27679	12.2

Table 24. Nursery plantcane means of the 2012 “L” assignment series on a Baldwin silty clay soil at Iberia Research Station in Jeanerette, Louisiana in 2013.

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP 96-540	12445	51.1	244	2.70	37888	11.0
L 99-226	13339	52.2	256	3.24 +	32216	11.3
L 01-299	11014	47.6	231	2.45	38115	11.8
L 03-371	15266	59.7	257	2.61	45829	11.1
L 12-193	11776	42.3	279 +	2.33	36300	10.7
L 12-197	11787	45.3	261	2.34	38796	11.3
L 12-198	9175	35.8	256	1.96 -	36754	10.3
L 12-199	10016	39.3	256	2.14 -	36754	12.7 +
L 12-201	14939	57.6	261	3.29 +	35393	10.1
L 12-202	11439	45.1	254	2.40	37888	11.5
L 12-218	15543	60.6	256	2.75	44241	14.1 +
L 12-227	12684	48.1	263	2.93	32897	12.6 +
L 12-229	9489	38.7	246	1.85 -	42426	11.9
L 12-230	10823	45.1	241	2.53	35619	9.8
L 12-232	9261	39.6	233	2.56	30855	11.4

Table 25. Infield first-stubble means of the 2009 “Ho”, “HoCP” and 2010 “L” assignment series across 2 locations (Blackberry and Donnie Vallot Farms) in 2013.

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP96-540	9076	38.6	235	2.44	31733	12.3
L99-226	9650	37.2	259 +	2.69	27768	12.4
L 01-299	9850	40.9	241	1.60	51418 +	12.2
L 03-371	8665	33.5	259 +	2.08	32392	10.8 -
HoCP 04-838	8629	36.5	237	2.04	35758	12.3
HoCP 09-804	9763	39.6	247	1.57	50801 +	12.9
Ho 09-840	8175	34.0	242	1.46	47067 +	12.0
L 10-147	8910	35.8	251	2.35	30771	10.8 -

Table 26. Infield plantcane means of the 2010 “Ho” and 2011 “L” assignment series across 2 locations (Blackberry and Donnie Vallot Farms) in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	8412	36.9	229	2.51	29513	12.3
L 99-226	9801	37.6	262 +	2.56	29133	12.6
L 01-299	8878	38.6	230	1.78 -	43453	12.8
L 03-371	10027	39.1	257 +	2.00 -	39367	12.0
Ho 10-937	9966	41.2	240	2.45	33377	12.3
L 11-168	8071	33.1	241	2.16	30293	13.6
L 11-172	8520	36.2	233	2.53	28351	13.8 +
L 11-183	10452	41.2	252 +	2.40	36398	11.6
L 11-187	9499	37.7	251 +	2.20	35161	13.5
L 11-191	10595	41.3	256 +	2.11	39115	9.9 -

Table 27. Infield and nursery first-stubble means of the 2009 “Ho” and “HoCP” and 2010 “L”, and “Ho” assignment series across 5 locations (Blackberry, Melancon, Newton, Westfield, and Donnie Vallot Farms) in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	8850	36.8	242	2.15	34400	11.6
L 99-226	11062	42.7	261 +	2.54 +	33722	11.8
L 01-299	9013	38.5	238	1.65 -	47466 +	11.9
L 03-371	10599	40.6	262 +	1.96	41779 +	10.2 -
HoCP 04-838	9371	39.5	242	1.86 -	42617 +	12.2 +
HoCP 09-804	10265	42.2	249	1.45 -	55011 +	12.5 +
Ho 09-840	8678	36.5	244	1.35 -	51277 +	11.6
L 10-147	10452	42.3	250	2.20	39170	10.3 -
Ho 10-937	9406	37.2	252	2.17	34280	11.6

Table 28. Infield and nursery plantcane means of the 2010 “Ho” and 2011 “L” , “Ho” and “HoCP” assignment series across 5 locations (Blackberry, Melancon, Newton, Sugarland Acres, and Westfield) in 2013.

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP 96-540	9138	38.6	237	2.36	32750	12.0
L 99-226	11477 +	44.5	258 +	2.64 +	33796	12.6
L 01-299	9517	39.5	239	1.94 -	40686 +	12.6
L 03-371	10285	40.5	253 +	2.09 -	38870 +	11.1 -
Ho 10-937	10773	44.1	242	2.42	36125	12.1
L 11-168	9340	37.7	247	2.08 -	36220	13.3 +
L 11-172	9026	37.7	238	2.43	31269	13.9 +
L 11-183	11787 +	46.8 +	252 +	2.31	41276 +	11.4
L 11-187	10816 +	41.9	257 +	2.16	39148 +	13.3 +
L 11-191	10522	42.7	246	1.99 -	43198 +	10.1 -
HoCP 11-504	9357	41.8	226	2.20	38159	12.6
Ho 11-511	10924	43.1	252 +	2.77 +	30838	13.4 +
Ho 11-512	13037 +	47.9 +	270 +	2.59	36828	11.6
Ho 11-515	11321 +	45.0	252 +	2.16	41910 +	12.3
Ho 11-529	9532	38.6	247	1.95 -	40337 +	12.9
Ho 11-532	10480	42.3	248	2.11	40155 +	12.7
HoCP 11-548	10588	40.6	259 +	2.31	35255	14.2 +
Ho 11-556	11429 +	45.0	253 +	2.03 -	44995 +	12.3
Ho 11-573	8782	32.4	269 +	1.99 -	32895	13.1 +
HoCP 11-576	8598	34.5	248	2.00 -	34771	13.2 +

Table 29. Nursery second-stubble means of the 2009 “Ho”, “HoCP”, and “L” assignment series across 3 locations (Newton, Melancon and Westfield) in 2013.

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP96-540	8193	36.7	223	1.81	40354	10.7
L 99-226	10572 +	42.6	248 +	2.40 +	35272	12.2 +
L 99-233	10824 +	46.2 +	237	1.81	51304 +	13.4 +
L 01-283	12402 +	51.3 +	241	1.72	59774 +	10.9
L 01-299	9891	42.4 +	234	1.58	56689 +	12.6 +
L 09-112	12383 +	54.9 +	226	2.26 +	48824	12.4 +
HoCP 09-804	13061 +	50.4 +	260 +	1.37 -	73326 +	13.7 +
Ho 09-840	8418	40.2	210	1.33 -	60621 +	11.1

Table 30. Nursery first-stubble means of the 2010 “Ho” and “L” assignment series across 3 locations (Newton, Melancon and Westfield) in 2013.

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP 96-540	8699	35.6	246	1.95	36179	11.2
L99-226	12003 +	46.4 +	262	2.45 +	37692	11.4
L 01-299	8455	37.0	236	1.68	44831 +	11.8
L 03-371	11888 +	45.3 +	264	1.89	48037 +	9.8 -
HoCP 04-838	9866	41.5	245	1.73	47190 +	12.2 +
L 10-147	11480 +	46.7 +	249	2.09	44770 +	10.0 -
Ho 10-937	9741	38.9	253	2.10	37087	11.4

Table 31. Nursery plantcane means of the 2011 “Ho”, “HoCP” and “L” assignment series across 3 locations (Newton, Melancon and Westfield) in 2013.

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP 96-540	9622	39.7	242	2.26	34909	11.7
L 99-226	12595 +	49.1 +	256	2.69 +	36905	12.5
L 01-299	9944	40.2	244	2.05	38841	12.3
L 03-371	10457	41.5	251	2.15	38539	10.2 -
L 11-168	10186	40.8	251	2.03	40172 +	13.1 +
L 11-172	9362	38.7	242	2.36	33215	14.1 +
L 11-183	12677 +	50.5 +	252	2.26	44528 +	11.3 -
L 11-187	11694	44.8	261 +	2.14	41806 +	13.1 +
L 11-191	10473	43.7	240	1.91 -	45920 +	10.3 -
HoCP 11-504	9895	43.8	227 -	2.18	39991 +	12.5
Ho 11-511	11462	45.1	253	2.75 +	32670	13.3 +
Ho 11-512	13575 +	49.8 +	271 +	2.58 +	38660	11.5
Ho 11-515	11859	47.0	254	2.15	43742 +	12.2
Ho 11-529	10070	40.6	248	1.93 -	42169 +	12.7
Ho 11-532	11018	44.2	250	2.10	41987 +	12.5
HoCP 11-548	11125	42.6	261 +	2.30	37087	14.0 +
Ho 11-556	11967 +	46.9	255	2.01	46827 +	12.2
Ho 11-573	9320	34.3	270 +	1.98	34727	13.0 +
HoCP 11-576	9136	36.5	249	1.98	36603	13.0 +

Table 32. Nursery plantcane means of the 2012 “L” assignment series across 3 locations (St.Gabriel, Iberia and U.S.D.A.- Ardoyne Farms) in 2013.

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP96-540	11166	47.2	237	2.83	33653	11.2
L99-226	14041 +	56.2 +	250 +	3.26 +	34561	12.4 +
L01-299	12564	55.8	225	2.79	39401	12.5 +
L 03-371	15670 +	62.0 +	252 +	2.84	43484 +	10.9
L 12-193	10396	38.1 -	273 +	2.45	31158	11.9 +
L 12-197	10556	43.1	245	2.35 -	36678	11.4
L 12-198	8305 -	33.5 -	248	2.00 -	33578	11.0
L 12-199	9731	39.4	247	2.37 -	33578	12.9 +
L 12-201	13347 +	53.0	252 +	3.10 +	34409	10.7
L 12-202	10253	41.0	250 +	2.43 -	33880	12.3 +
L 12-218	13285 +	57.4 +	230	3.01	38871	14.5 +
L 12-227	11801	46.9	252 +	3.10	30628	13.2 +
L 12-229	8029 -	34.1 -	235	2.06 -	33880	11.9 +
L 12-230	9612	41.9	229	2.67	31460	10.3 -
L 12-232	9192	39.7	231	2.54	31233	12.2 +

Table 33. Nursery first-stubble means of the 2011 “L” assignment series across 3 locations (St. Gabriel, Iberia and U.S.D.A.- Ardoyne Farms) in 2013.

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP 96-540	10823	44.3	244	2.27	39098	11.8
L 99-226	13736 +	51.1	269 +	2.61 +	39552	13.3 +
L 01-299	12748	50.0	256 +	1.93 -	51728	13.6 +
L 03-371	12849	49.6	260 +	2.08	47644	11.7
HoCP 04-838	11483	43.7	263 +	1.87 -	46963	13.4 +
L 11-168	10194	39.0	262 +	2.03	38871	13.2 +
L 11-172	11845	44.9	263 +	2.43 +	37056	13.3 +
L 11-183	12096	47.3	257 +	2.22	42804	12.3
L 11-187	11250	42.3	267 +	2.02 -	42350	13.4 +
L 11-191	8072	32.0 -	252	1.67 -	38493	10.0 -

Table 34. Nursery second-stubble means of the 2010 “L” assignment series across 3 locations (St. Gabriel, Iberia and U.S.D.A.- Ardoyne Farms) in 2013.

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	13010	53.1	245	2.17	49232	12.0
L 99-226	14218	52.8	269 +	2.57 +	40686	13.0
L 99-233	9855	37.6	262 +	1.69 -	45224	14.2 +
L 01-283	12180	48.5	250	1.82	53164	11.6
L 01-299	11868	49.0	243	1.66 -	57399	13.4 +
L 10-147	11039	43.3	256	2.18	39854	11.5

2013 LOUISIANA "Ho" NURSERY AND INFIELD VARIETY TRIALS

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In the USDA sugarcane variety program, superior experimental varieties are assigned permanent "HoCP" or "Ho" numbers three years after selection in the seedling stage. These varieties are then planted in replicated yield trials at SRU's Ardoyne Farm in Schriever and at the LSU AgCenter's Iberia Research Station in Jeanerette and Sugar Research Station in St. Gabriel. The following year, experimental varieties advanced for further testing are pooled with varieties from the "L" series and planted in replicated nursery yield trials on commercial farms (Paincourtville, Cecilia, and Bunkie, LA) representing different regions of the sugarcane belt. From this stage on, varieties from the SRU and LSU AgCenter are included in all yield tests (infield and outfield trials) and yield estimates are based on plot weights. Two years after assignment, infield trials are planted at three locations (Ardoyne Farm in Schriever and commercial farms located in Vacherie and Abbeville), and varieties are introduced to primary stations for seed increase and outfield locations for testing.

The SRU's nursery test plots planted during the year of assignment employ a randomized complete block design with two replications. Plots are 16 feet long by six feet (one row) wide with a four-foot alley between plots. A minimum of three commercial varieties are planted in each test for comparison purposes. In addition to experimental commercial varieties, clones from the SRU Recurrent Selection for Borers (RSB) program are included in nursery trials. Yield data collected on RSB clones give breeders agronomic information for selecting what parents to use in the breeding program. The year after assignment, varieties from SRU'S program are combined with varieties from the LSU program and planted in nurseries on commercial farms. The plot lengths in these tests are increased to 20 feet.

In the spring and summer, researchers rate nursery test plots for yield traits such as population, height, diameter, erectness, etc. Mature, millable stalks are counted in each plot in late July or August. A 10-stalk sample is hand-cut from plots of active varieties during the harvest season. Samples from USDA nurseries are taken to the Juice and Milling Quality Laboratory at the USDA Ardoyne Farm, where they are weighed to determine stalk weight and processed for sucrose analysis. Brix and pol values are used to estimate the yield of theoretical recoverable sugar (TRS) per ton of cane. Estimated yields of cane and sugar per acre, and number of stalks per acre are calculated based on results from juice analyses, mature millable stalk counts, and mean stalk weight. Varieties with yields equal or higher than the control varieties (both cane tonnage and sugar per ton) and disease and insect resistance are advanced for further testing.

Infield evaluations on commercial farms are conducted cooperatively with LSU AgCenter sugarcane variety personnel. Infield tests are established in a randomized complete block design with two replications and at least three commercial varieties as controls. The plot size in infield tests are two rows wide by 24 feet long. A 10-stalk sample is hand-cut from each plot just prior to combine harvesting and sent to the lab at the Ardoyne Farm, where it is weighed and processed through the pre-breaker/press for sucrose and fiber analysis. Brix and pol values are then used to estimate the yield of theoretical recoverable sugar (TRS) per ton of cane. Plots are weighed with a tractor-pulled weigh-wagon equipped with electronic load cells mounted in the axle and hitch. The weight of harvested cane in each plot, stalk weight, and sucrose content are used to estimate sugar per acre, tons of cane per acre, sugar per ton of cane, and number of stalks per acre.

Table 1 lists planting and harvest dates of USDA nursery and infield evaluations. Results of infield and nursery trials are presented in Tables 2 to 21. Statistical analyses were conducted for each test and for each series combined across locations using PROC MIXED procedures in SAS (version 9.1). For purposes of comparison, the check variety, HoCP 96-540, which is currently the leading variety in acreage in the state, is highlighted in each table. Yield values which are significantly higher or lower (P=0.05) than values for HoCP 96-540 are noted with a '+' or '-', respectively.

Table 1. Planting and harvest dates of "Ho" nursery & infield tests in 2013.

Series	Location[1/]	Soil Series [2/]	Test type	Planting Date	Harvest Dates		
					2011	2012	2013
2008	BLK	Csl	Infield	9/10/10	12/12	12/13	11/12
2010	AFL	Csl	Nursery	10/15/10	12/13	11/28	10/30
2010	IRS	Bsc	Nursery	10/21/10	11/17	11/14	11/13
2010	STG	Cscl	Nursery	10/19/10	12/02	11/20	11/08
2009	AFH	Sc	Infield	9/28/11		11/13	11/22
2009	BLK	Csl	Infield	8/26/11		12/13	12/17
2009	VAL	Pasl	Infield	9/22/11		12/12	12/09
2011	AFH	Csl	Nursery	10/20/11		12/10	10/30
2011	IRS	Bsc	Nursery	10/21/11		11/14	11/19
2011	STG	Sc	Nursery	10/25/11		12/06	-
2010	AFH	Sc	Infield	10/30/12			11/22
2010	BLK	Csl	Infield	8/17/12			11/12
2010	VAL	Pasl	Infield	9/10/12			12/09
2012	AFH	Csl	Nursery	10/17/12			12/16
2012	IRS	Bsc	Nursery	10/29/12			12/12
2012	STG	Sc	Nursery	10/19/12			12/10
2011	AFH	Sc	Infield	9/30/13			
2011	BLK	Csl	Infield	8/30/13			
2011	VAL	Pasl	Infield	9/03/13			
2013	AFH	Csl	Nursery	11/06/13			
2013	IRS	Bsc	Nursery	11/13/13			
2013	STG	Sc	Nursery	11/08/13			

[1/] AFH = Ardoyne Farm heavy soil and AFL = Ardoyne Farm Light soil in Schriever, BLK = Blackberry Farms in Vacherie, , IRS = Iberia Research Station in Jeanerette, STG = St. Gabriel Research Station in St. Gabriel, SUG = Sugarland Acres in Youngsville, VAL = Vallot Farm in Abbeville.

[2/] Bsc = Baldwin silty clay, Cosl = Coteau silt loam, Cscl = Commerce silty clay loam, Csl = Commerce silt loam, Pasl = Patoutville silt loam, Sc = Sharkey clay

Table 2. Infield second-stubble means of the 2008 “Ho” and 2009 “L” assignment series on a Commerce silt loam soil at Blackberry Farms in Vacherie, LA in 2013.

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
HoCP 96-540	7904	33.1	238	2.21	30611	13.2
L 99-226	9141	32.9	278 +	2.53	26023	13.7
L 99-233	11593 +	47.9 +	242	1.92	50037 +	15.6 +
L 01-283	9646	35.5	272 +	1.53	46458 +	12.3
L 01-299	13254 +	56.6 +	234	2.08	54844 +	13.8
L09-112	11309 +	47.5 +	239	2.26	42533	13.3

Table 3. Infield first-stubble means of the 2009 “L” assignment series on a Sharkey clay soil at Ardoyne Farm in Schriever, LA in 2013.

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
HoCP 96-540	9039	36.2	250	1.85	39196	12.4
L 99-226	5907	22.8	260 +	2.24 +	20327	13.2 +
L 01-299	7432	29.8	249	1.51	39430	13.4 +
L 03-371	8052	31.0	261 +	2.17	28367	11.2
HoCP 04-838	7110	27.9	255	1.67	33478	13.3 +
L 09-112	8182	34.0	241	1.81	37596	13.5 +
HoCP 09-804	6587	25.0	264 +	1.47	34382	13.2
Ho 09-840	8610	34.7	249	1.35	51353	12.5

Table 4. Infield first-stubble means of the 2009 “HoCP” and 2010 “L” assignment series on a Commerce silt loam soil at Blackberry Farms in Vacherie, LA in 2013.

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
HoCP 96-540	8577	38.0	226	2.44	31490	12.5
L 99-226	8563	35.4	243	2.61	27325	13.0
L 01-299	9808	41.8	234	1.76	47534 +	12.4
L 03-371	8471	33.6	253	2.11	32004	10.7
HoCP 04-838	9554	41.3	232	2.20	37761	12.3
HoCP 09-804	10675 +	44.2 +	242	1.67	53253 +	13.4
Ho 09-840	8727	37.5	233	1.36	55181 +	11.9
L 10-147	10237 +	42.9 +	239	2.50	34643	11.7

Table 5. Infield first-stubble means of the 2009 “HoCP” and 2010 “L” assignment series on a Patoutville silt loam soil at Vallot Farms in Abbeville, LA in 2013.

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
HoCP 96-540	9576	39.2	244	2.45	31975	12.1
L 99-226	10738	39.0	276	2.78	28211	11.8
L 01-299	9891	40.0	248	1.45	55303 +	12.0
L 03-371	8858	33.4	266	2.05	32779	11.0
HoCP 04-838	7704	31.8	243	1.89	33755	12.4
HoCP 09-804	8850	35.1	252	1.46	48349 +	12.5
Ho 09-840	7623	30.5	251	1.57	38952	12.0
L 10-147	7583	28.8	263	2.21	26898	10.0

Table 6. Infield first-stubble means of the 2009 “L” assignment series across two locations (Blackberry Farms and Vallot Farm) in 2013.

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
HoCP 96-540	9076	38.6	235	2.44	31733	12.3
L 99-226	9650	37.2	259 +	2.69	27768	12.4
L 01-299	9850	40.9	241	1.60 -	51418 +	12.2
L 03-371	8665	33.5	259 +	2.08 -	32392	10.8 -
HoCP 04-838	8629	36.5	237	2.04 -	35758	12.3
HoCP 09-804	9763	39.6	247	1.57 -	50801 +	12.9
Ho 09-840	8175	34.0	242	1.46 -	47067 +	12.0
L 10-147	8910	35.8	251 +	2.35	30771	10.8 -

Table 7. Infield plant-cane means of the 2010 “Ho” assignment series on a Sharkey clay soil at Ardoyne Farm in Schriever, LA in 2013.

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
HoCP 96-540	8212	35.3	233	2.74	25815	13.1
L 99-226	9399	35.5	265 +	2.90	24651	12.6
L 01-299	9428	38.5	245	2.20	35050	12.8
L 03-371	8376	33.3	252 +	2.43	27645	11.0
Ho 10-937	7994	32.2	249 +	2.47	26120	13.9

Table 8. Infield plant-cane means of the 2010 “Ho” and “HoCP” and 2011 “L” assignment series on a Commerce silt loam soil at Blackberry Farms in Vacherie, LA in 2013.

Variety	Sugar/ acre (lbs.)		Tons/ acre (tons)	Sugar/ ton (lbs.)	Weight/ stalk (lbs.)	Stalks/ acre (no.)	Fiber (%)	
HoCP 96-540	9547		42.6	225	2.49	34206	11.9	
L 99-226	11733	+	45.4	260	2.78	32798	13.1	
L 01-299	9304		40.1	232	1.90	42284	13.4	
L 03-371	11410		44.0	261	2.08	42944	12.8	
Ho 10-937	12270	+	48.9	251	2.63	37224	12.3	
L 11-168	11158		44.4	252	2.23	39805	14.1	+
L 11-172	11430		47.2	243	2.60	36305	13.9	+
L 11-183	12701	+	48.7	261	2.12	47375	11.7	
L 11-187	11603	+	45.3	256	2.15	42819	13.4	
L 11-191	12568	+	48.6	259	2.15	45163	10.0	

Table 9. Infield plant-cane means of the 2010“Ho” and “HoCP” and 2011 “L” assignment series on a Patoutville silt loam soil at Vallot Farms in Abbeville, LA in 2013.

Variety	Sugar/ acre (lbs.)		Tons/ acre (tons)	Sugar/ ton (lbs.)		Weight/ stalk (lbs.)	Stalks/ acre (no.)		Fiber (%)	
HoCP 96-540	7277		31.2	233		2.53	24821		12.7	
L 99-226	7869		29.8	264	+	2.35	25469		12.2	
L 01-299	8452		37.0	229		1.66	44621	+	12.2	
L 03-371	8644		34.3	253	+	1.93	35790	+	11.3	
Ho 10-937	7662		33.5	229		2.27	29531		12.3	
L 11-168	4983		21.9	230		2.10	20780		13.0	
L 11-172	5610		25.2	224		2.46	20397		13.6	
L 11-183	8204		33.8	243		2.68	25420		11.4	
L 11-187	7396		30.1	246		2.25	27502		13.6	
L 11-191	8623		34.0	253	+	2.06	33067		9.8	

Table 10. Infield plant-cane means of the 2010 “Ho” and “HoCP” and 2011 “L” assignment series across two locations (Blackberry Farms and Vallot Farm) in 2013.

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
HoCP 96-540	8412	36.9	229	2.51	29513	12.3
L 99-226	9801	37.6	262 +	2.56	29133	12.6
L 01-299	8878	38.6	230	1.78 -	43453 +	12.8
L 03-371	10027	39.1	257 +	2.00 -	39367	12.0
Ho 10-937	9966	41.2	240	2.45	33377	12.3
L 11-168	8071	33.1	241	2.16	30293	13.6 +
L 11-172	8520	36.2	233	2.53	28351	13.8 +
L 11-183	10452	41.2	252 +	2.40	36398	11.6
L 11-187	9499	37.7	251 +	2.20	35161	13.5 +
L 11-191	10595	41.3	256 +	2.10	39115	9.9 -

Table 11. Nursery second-stubble means of the 2010 “Ho” and “HoCP” assignment series on a Commerce silt loam soil at the Ardoyne Farm in Schriever, LA in 2013.

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
HoCP 96-540	11803	49.6	239	2.25	44241
L 99-226	8551	33.6	255	2.02	33351 -
L 99-233	12486	48.2	258 +	1.93	49459
L 01-283	13418	48.3	278 +	1.69	57173 +
L 01-299	10905	43.9	247	1.56	56038 +
Ho 10-937	15337	55.7	276 +	2.34	47871
Ho 10-9624[3/]	9025	34.9	259 +	1.69	41518
Ho 10-9625[3/]	10274	39.9	258 +	1.62	49005
Ho 10-9626[3/]	9529	35.6	268 +	1.50	47417

[3/] Varieties from the SRU’s Recurrent Selection for Borers (RSB) program.

Table 12. Nursery second-stubble means of the 2010 "Ho" and "HoCP" assignment series on a Baldwin silty clay soil at the Iberia Research Station in Jeanerette, LA in 2013.

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
HoCP 96-540	13268	54.2	245	2.38	45602
L 99-226	10401	38.4	269	2.27	34031
L 99-233	13843	49.0	278	1.55 -	61256
L 01-283	14004	48.3	290	1.78	54223
L 01-299	15462	58.1	266	1.84	63071
Ho 10-937	11563	41.9	277	2.29	36981
Ho 10-9624[3/]	6426	25.0	257	1.27 -	39023
Ho 10-9625[3/]	9488	36.4	263	2.13	33578
Ho 10-9626[3/]	10824	39.0	277	1.70 -	45829

[3/] Varieties from the SRU'S Recurrent Selection for Borers (RSB) program.

Table 13. Nursery second-stubble means of the 2010 "Ho" and "HoCP" assignment series on a Commerce silt loam soil at the Sugar Research Station in St. Gabriel, LA in 2013.

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
HoCP 96-540	14751	60.9	242	2.12	57626
L 99-226	9575 -	41.3 -	233	2.38	34712 -
L 99-233	10804 -	42.3 -	256	1.93	44014 -
L 01-283	14201	52.7	270	1.86	56946
L 01-299	14934	62.0	241	1.97	63071
Ho 10-937	11872	47.8 -	248	2.31	41291 -
Ho 10-9624[3/]	8347 -	36.0 -	232	1.58 -	45602 -
Ho 10-9625[3/]	12458	50.1	248	2.02	49686
Ho 10-9626[3/]	11996	45.8 -	263	1.66 -	55131

[3/] Varieties from the SRU's Recurrent Selection for Borers (RSB) program.

Table 14. Nursery second-stubble means of the 2010 "Ho" and "HoCP" assignment series across locations (Ardoyne Farm, Iberia Research Station, and Sugar Research Station) in 2013.

Variety	Sugar/ acre		Tons/ acre		Sugar/ ton		Weight/ stalk		Stalks/ acre	
	(lbs.)		(tons)		(lbs.)		(lbs.)		(no.)	
HoCP 96-540	13274		54.9		242		2.25		49156	
L 99-226	9509	-	37.8	-	252		2.22		34031	-
L 99-233	12378		46.5		264	+	1.80	-	51576	
L 01-283	13874		49.8		279	+	1.78	-	56114	
L 01-299	13767		54.6		251		1.79	-	60727	+
Ho 10-937	12924		48.4		267	+	2.31		42048	
Ho 10-9624[3]	7933	-	31.9	-	249		1.51	-	42048	
Ho 10-9625[3]	10740		42.2	-	256	+	1.92	-	44089	
Ho 10-9626[3]	10783		40.1	-	269	+	1.62	-	49459	

[3/] Varieties from the SRU'S Recurrent Selection for Borers (RSB) program.

Table 15. Nursery first-stubble means of the 2011 "Ho" and "HoCP" assignment series on a Commerce silt loam soil at the Ardoyne Farm in Schriever, LA in 2013.

Variety	Sugar/ acre		Tons/ acre		Sugar/ ton		Weight/ stalk		Stalks/ acre	
	(lbs.)		(tons)		(lbs.)		(lbs.)		(no.)	
HoCP 96-540	10013		40.7		246		1.96		41518	
L 99-226	11795		44.5		265		2.29		39023	
L 01-299	10941		41.2		266		1.68		49005	
L 03-371	10802		41.8		258		1.81		46056	
HoCP 04-838	8135		30.1		271	+	1.59		37888	
HoCP 11-504	9746		41.7		234		1.96		42879	
Ho 11-511	10790		38.0		284	+	2.10		35846	
Ho 11-512	10131		34.9		291	+	2.05		34258	
Ho 11-515	11809		45.6		259		1.91		47871	
Ho 11-529	8207		29.3		280	+	1.49	-	39476	
Ho 11-532	12241		46.3		265		1.94		47871	
HoCP 11-548	8579		32.3		265		2.02		31989	
Ho 11-556	7714		29.3		264		1.47	-	40157	
Ho 11-573	12939		51.9		250		2.45	+	42199	
HoCP 11-576	8476		28.6		297	+	1.77		32443	
Ho 11-9627[3/]	6090	-	27.2	-	224	-	1.12	-	49005	
Ho 11-9628[3/]	6167	-	31.4		200	-	1.14	-	54904	+
Ho 11-9629[3/]	7691		37.4		205	-	1.20	-	62391	+
Ho 11-9630[3/]	10846		44.6		242		1.84		48551	

[3/] Varieties from the SRU's Recurrent Selection for Borers (RSB) program.

Table 16. Nursery first-stubble means of the 2011 "Ho" and "HoCP" assignment series on a Baldwin silty clay soil at the Iberia Research Station in Jeanerette, LA in 2013.

Variety	Sugar/ acre (lbs.)		Tons/ acre (tons)		Sugar/ ton (lbs.)		Weight/ stalk (lbs.)		Stalks/ acre (no.)	
HoCP 96-540	12481		51.8		241		2.55		40611	
L 99-226	16701		57.1		292	+	3.25	+	35166	
L 01-299	13666		50.9		269	+	1.75	-	58534	+
L 03-371	13179		46.1		286	+	2.05	-	45375	
HoCP 04-838	12372		45.0		277	+	2.10		42199	
HoCP 11-504	12160		47.7		255		1.75	-	55131	+
Ho 11-511	18398	+	64.5		286	+	3.02		42879	
Ho 11-512	20796	+	66.5		313	+	2.68		49686	+
Ho 11-515	15059		55.5		271	+	2.08		53316	+
Ho 11-529	14602		50.3		291	+	1.99	-	50820	+
Ho 11-532	14879		53.0		280	+	2.07	-	51274	+
HoCP 11-548	12880		45.7		281	+	2.61		34939	
Ho 11-556	12861		44.4		290	+	2.13		42199	
Ho 11-573	15370		57.8		266	+	2.59		44014	
HoCP 11-576	14745		51.4		288	+	2.25		45602	
Ho 11-9627[3/]	9690		38.8		249		1.35	-	57399	+
Ho 11-9628[3/]	11229		50.5		223		1.61	-	62618	+
Ho 11-9629[3/]	12046		48.7		248		1.64	-	59668	+
Ho 11-9630[3/]	13378		48.0		279	+	2.12		45375	

[3/] Varieties from the SRU's Recurrent Selection for Borers (RSB) program.

Table 17. Nursery first-stubble means of the 2011 "Ho" and "HoCP" assignment series across locations (Ardoyne Farm and Iberia Research Station) in 2013.

Variety	Sugar/ acre (lbs.)		Tons/ acre (tons)		Sugar/ ton (lbs.)		Weight/ stalk (lbs.)		Stalks/ acre (no.)	
HoCP 96-540	11247		46.3		243		2.26		41064	
L 99-226	14248		50.8		278	+	2.77	+	37094	
L 01-299	12304		46.0		268	+	1.71	-	53769	+
L 03-371	11990		44.0		272	+	1.93		45715	
HoCP 04-838	10254		37.5		274	+	1.84		40043	
HoCP 11-504	10953		44.7		244		1.85		49005	
Ho 11-511	14594	+	51.3		285	+	2.56		39363	
Ho 11-512	15463	+	50.7		302	+	2.36		41972	
Ho 11-515	13434		50.6		265	+	1.99		50593	+
Ho 11-529	11405		39.8		285	+	1.74	-	45148	
Ho 11-532	13560		49.6		273	+	2.00		49572	
HoCP 11-548	10730		39.0		273	+	2.31		33464	
Ho 11-556	10288		36.8		277	+	1.80	-	41178	
Ho 11-573	14154		54.8		258		2.52		43106	
HoCP 11-576	11611		40.0		292	+	2.01		39023	
Ho 11-9627[3/]	7890	-	33.0	-	237		1.23	-	53202	+
Ho 11-9628[3/]	8698		40.9		211	-	1.38	-	58761	+
Ho 11-9629[3/]	9868		43.0		226		1.42	-	61029	+
Ho 11-9630[3/]	12112		46.3		260		1.98		46963	

[3/] Varieties from the SRU's Recurrent Selection for Borers (RSB) program.

Table 18. Nursery plant cane means of the 2012 “Ho” and “HoCP” assignment series on a Sharkey clay soil at the Ardoyne Farm in Schriever, LA in 2013.

Variety	Sugar/ acre (lbs.)	Tons/ acre (tons)	Sugar/ ton (lbs.)	Weight/ stalk (lbs.)	Stalks/ acre (no.)
HoCP 96-540	11130	40.3	277	2.56	31309
L 99-226	12310	43.0	288	3.48 +	25410
L 01-299	12530	43.6	287	2.59	34031
L 03-371	12444	44.1	282	2.10	41745 +
Ho 11-9403 [4/]	11999	43.2	277	1.99	43333 +
Ho 11-9404 [4/]	10413	41.8	247 -	2.35	35619
Ho 11-9405 [4/]	7318	38.8	188 -	1.79 -	43560 +
Ho 11-9406 [4/]	10189	37.0	275	1.92 -	38796
Ho 12-601	12097	45.1	267	1.96	45148 +
Ho 12-602	13053	45.1	290	2.19	41291
Ho 12-605	10900	42.3	258 -	2.07	41064
Ho 12-606	14646	60.9	241 -	2.52	48098 +
Ho 12-609	13705	50.6	271	2.42	41972 +
Ho 12-610	12902	48.4	268	2.68	36300
Ho 12-611	13125	46.9	280	2.63	35619
Ho 12-612	13593	47.8	285	2.15	44694 +
Ho 12-614	12613	47.1	268	2.51	37434
Ho 12-615	12960	45.9	283	2.11	43787 +
Ho 12-616	16247	55.4	293	2.68	41972 +
Ho 12-617	10862	40.8	266	2.29	35393
Ho 12-620	9812	37.9	260	2.13	35846
Ho 12-624	11233	40.7	276	2.03	40157
Ho 12-625	11474	39.9	287	1.92 -	41745 +
Ho 12-626	14677	52.9	278	2.14	49459 +
Ho 12-627	14845	53.6	277	2.63	40838
Ho 12-628	12183	45.8	267	2.29	39930
Ho 12-630	13148	46.7	282	2.87	32443
Ho 12-632	12619	45.9	276	2.59	35393
Ho 12-633	13954	52.9	264	2.36	44921 +
Ho 12-635	14734	49.0	301 +	2.00	49005 +
Ho 12-638	13225	46.5	286	2.21	41745 +
HoCP 12-640	12845	49.1	264	2.31	42653 +
HoCP 12-641	15646	54.7	287	2.40	45602 +
HoCP 12-643	15305	55.3	277	2.76	40157
HoCP 12-647	12114	42.6	284	2.00	42653 +
HoCP 12-649	15857	55.2	288	2.71	40838
HoCP 12-650	13120	45.4	289	2.30	39476
HoCP 12-653	12421	43.5	286	1.89 -	46056 +
HoCP 12-654	11294	40.4	280	2.44	33124

Table 18. (Continued)

Variety	Sugar / acre	Tons / acre	Sugar / ton	Weight / stalk	Stalks / acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
HoCP 12-655	13185	45.5	290	2.15	43787 +
HoCP 12-656	12460	43.9	284	2.49	35166
HoCP 12-658	11095	40.0	277	1.59 -	50366 +
HoCP 12-659	11083	39.5	281	2.43	32216
HoCP 12-660	16106	56.3	286	2.86	39476
HoCP 12-661	12134	40.4	301 +	2.27	35393
HoCP 12-662	14090	51.2	277	2.24	45148 +
HoCP 12-664	13127	47.8	275	2.28	41972 +
HoCP 12-666	12437	47.1	263	2.58	36981
HoCP 12-667	14314	50.6	283	2.39	42426 +
HoCP 12-669	9147	35.1	259 -	2.34	29721
HoCP 12-671	11944	42.8	280	2.18	39249
HoCP 12-673	13196	49.6	266	2.55	39023
HoCP 12-675	13242	49.9	266	2.50	39930
HoCP 12-676	14684	50.1	293	2.41	41518 +
HoCP 12-677	11127	38.2	292	2.68	28586
Ho 12-9631 [3/]	7808	31.8	246 -	2.88	22234
Ho 12-9632 [3/]	10962	42.3	260	3.23 +	26544
Ho 12-9633 [3/]	11614	41.4	281	2.33	35619
Ho 12-9634 [3/]	9496	45.5	209 -	2.05	44468 +

[3/] Varieties from the SRU's Recurrent Selection for Borers (RSB) program.

[4/] Advanced varieties from the SRU's Basic Breeding program.

Table 19. Nursery plant-cane means of the 2012 "Ho" and "HoCP" assignment series on a Baldwin silty clay soil at the Iberia Research Station in Jeanerette, LA in 2013.

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
HoCP 96-540	12153	47.8	255	2.83	33804
L 99-226	14569	52.7	274	3.30 +	31989
L 01-299	13649	49.8	274	2.51	39703
L 03-371	12001	42.6	282 +	2.22 -	38342
Ho 12-601	11741	49.5	238	2.22 -	44468 +
Ho 12-602	11118	40.2	277	2.54	31763
Ho 12-605	13484	53.4	253	2.86	37434
Ho 12-606	10620	44.0	242	2.13 -	41518 +
Ho 12-609	11527	41.7	276	2.23 -	37434
Ho 12-610	11915	46.2	258	2.43	37888
Ho 12-611	10509	40.0	263	2.56	31309

Table 19. (Continued)

Variety	Sugar/ acre		Tons/ acre		Sugar/ ton		Weight/ stalk		Stalks/ acre	
	(lbs.)		(tons)		(lbs.)		(lbs.)		(no.)	
Ho 12-612	10084		40.0		254		2.40		33578	
Ho 12-614	11408		49.5		232		3.12		31763	
Ho 12-615	12677		48.3		262		2.24	-	43106	+
Ho 12-616	13066		44.8		292	+	2.60		34485	
Ho 12-617	12548		48.6		258		2.73		35846	
Ho 12-620	12806		52.0		247		3.02		34485	
Ho 12-624	10417		39.2		267		2.01	-	38569	
Ho 12-625	13151		47.3		279		2.40		39249	
Ho 12-626	10417		39.1		266		2.17	-	36073	
Ho 12-627	12097		42.9		282	+	2.15	-	40157	
Ho 12-628	9644		40.7		239		1.70	-	48098	+
Ho 12-630	12606		45.5		277		2.75		33124	
Ho 12-632	12897		47.1		274		3.05		30855	
Ho 12-633	13305		52.5		254		2.68		39249	
Ho 12-635	13233		44.5		297	+	2.11	-	42199	+
Ho 12-638	11459		41.5		276		2.26	-	36754	
HoCP 12-640	12264		46.7		263		2.23	-	42199	+
HoCP 12-641	11387		45.1		250		2.54		35393	
HoCP 12-643	10987		42.9		256		2.84		30174	
HoCP 12-647	11379		41.2		276		2.25	-	36754	
HoCP 12-649	14073		51.3		276		2.91		34939	
HoCP 12-650	8827	-	31.7	-	279		2.29	-	27679	
HoCP 12-653	11257		41.5		271		2.21	-	37208	
HoCP 12-654	9967		37.8		264		2.83		26771	-
HoCP 12-655	11183		38.3		292	+	2.05	-	37434	
HoCP 12-656	11855		42.4		280		2.49		34031	
HoCP 12-658	10812		40.3		268		1.81	-	44694	+
HoCP 12-659	9549		36.7		260		2.32	-	31763	
HoCP 12-660	14196		52.7		270		3.22		33351	
HoCP 12-661	9833		33.4	-	295	+	2.19	-	30401	
HoCP 12-662	11749		42.3		278		1.92	-	44014	+
HoCP 12-664	10792		42.7		253		2.38		35846	
HoCP 12-666	8842	-	38.8		228	-	3.02		25410	-
HoCP 12-667	14814		54.5		272		2.93		37208	
HoCP 12-669	10965		45.9		241		2.34	-	39249	
HoCP 12-671	12924		47.5		272		2.59		36754	
HoCP 12-673	11169		45.0		249		2.46		36527	
HoCP 12-675	11879		43.2		275		2.49		34712	
HoCP 12-676	12721		43.9		291	+	2.40		36527	
HoCP 12-677	9112		33.7	-	271		2.17	-	31082	
Ho 12-9631[3/]	6411	-	31.6	-	199	-	3.08		20419	-

Table 19. (Continued)

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
Ho 12-9632[3/]	11162	42.9	261	3.94 +	21780 -
Ho 12-9633[3/]	11205	40.6	276	2.43	33578
Ho 12-9634[3/]	6767 -	33.4 -	205 -	1.91 -	34712

[3/] Varieties from the SRU's Recurrent Selection for Borers (RSB) program.

Table 20. Nursery plant cane means of the 2012 "Ho" and "HoCP" assignment series on a Commerce silt loam soil at the Sugar Research Station in St. Gabriel, LA in 2013.

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
HoCP 96-540	10227	44.3	229	2.81	31309
L 99-226	12998	54.3	241	3.24	33578
L 01-299	12530	52.6	239	2.55	41064
L 03-371	10225	41.4	248	2.06 -	40157
Ho 12-601	7201	43.0	168 -	1.98 -	43560
Ho 12-602	9001	37.5	241	2.04 -	36300
Ho 12-605	9530	43.6	220	2.10 -	42199
Ho 12-606	10180	47.0	217	2.11 -	44694
Ho 12-609	8222	33.1	249	2.60	25637
Ho 12-610	9045	40.6	229	2.52	31082
Ho 12-611	10992	41.5	265 +	2.57	32897
Ho 12-612	12404	51.5	241	3.11	33124
Ho 12-614	12314	51.2	239	2.72	37661
Ho 12-615	8554	35.8	240	1.63 -	44694
Ho 12-616	10173	41.1	247	2.16 -	38115
Ho 12-617	8298	37.5	223	2.60	28813
Ho 12-620	10192	49.7	205	2.65	37661
Ho 12-624	9060	36.9	246	2.26	32897
Ho 12-625	8532	32.2	268 +	1.83 -	34712
Ho 12-626	8658	39.4	221	1.53 -	51274
Ho 12-627	11575	45.7	254	2.78	32897
Ho 12-628	10843	48.5	224	1.86 -	52181
Ho 12-630	11565	42.8	271 +	2.95	29040
Ho 12-632	7936	32.4	245	2.45	26544
Ho 12-633	10528	44.3	240	2.85	31082
Ho 12-635	10897	43.4	251	2.08 -	41745
Ho 12-638	9213	40.1	231	2.37	33804
HoCP 12-640	10235	44.0	233	2.36	39703
HoCP 12-641	9799	43.0	228	2.05 -	42426
HoCP 12-643	9319	39.8	234	2.82	28133

Table 20. (Continued)

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
HoCP 12-647	11667	46.0	254	2.23	41064
HoCP 12-649	10241	40.9	250	2.40	34258
HoCP 12-650	12139	45.7	266 +	2.64	34712
HoCP 12-653	7787	35.7	217	1.82 -	39249
HoCP 12-654	9432	36.8	256 +	2.10 -	35166
HoCP 12-655	5794 -	23.6	243	1.59 -	31082
HoCP 12-656	9986	39.4	254	2.46	32216
HoCP 12-658	7678	33.1	232	1.67 -	39703
HoCP 12-659	8466	34.4	247	1.85 -	37661
HoCP 12-660	11089	44.5	249	3.06	29040
HoCP 12-661	8818	33.5	262 +	2.09 -	31989
HoCP 12-662	7693	33.0	234	1.77 -	37434
HoCP 12-666	11265	52.3	216	2.83	36981
HoCP 12-667	10076	39.2	259 +	2.06 -	38115
HoCP 12-669	7798	34.5	224	2.25	29948
HoCP 12-671	11011	45.9	240	2.55	36073
HoCP 12-673	11778	50.6	233	2.55	39703
HoCP 12-675	10081	39.1	258 +	2.25	34712
HoCP 12-676	10057	40.0	252	2.24	35619
HoCP 12-677	8738	34.9	252	2.52	27679
Ho 12-9631[3/]	6244 -	27.9	226	2.65	20419
Ho 12-9632[3/]	8761	37.7	232	3.23	23368
Ho 12-9633[3/]	7998	32.8	244	2.11 -	31309
Ho 12-9634[3/]	7295	38.2	192 -	2.22	35393

[3/] Varieties from the SRU's Recurrent Selection for Borers (RSB) program.

Table 21. Nursery plant cane means of the 2012 “Ho” and “HoCP” assignment series across locations (Ardoyne Farm, Iberia Research Station, and Sugar Research Station) in 2013.

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
HoCP 96-540	11170	44.1	253	2.73	32141
L 99-226	13292	50.0	267	3.34 +	30326
L 01-299	12903	48.7	267	2.55	38266 +
L 03-371	11557	42.7	271 +	2.12 -	40081 +
Ho 12-601	10346	45.9	224 -	2.06 -	44392 +
Ho 12-602	11057	40.9	269	2.25 -	36451
Ho 12-605	11305	46.5	243	2.34 -	40233 +
Ho 12-606	11815	50.6	233 -	2.25 -	44770 +
Ho 12-609	11151	41.8	265	2.41	35014
Ho 12-610	11287	45.1	251	2.54	35090
Ho 12-611	11542	42.8	269	2.59	33275
Ho 12-612	12027	46.4	260	2.55	37132
Ho 12-614	12111	49.3	246	2.78	35619
Ho 12-615	11397	43.3	262	1.99 -	43863 +
Ho 12-616	13162	47.1	277 +	2.48	38191 +
Ho 12-617	10569	42.3	249	2.54	33351
Ho 12-620	10937	46.5	237	2.60	35998
Ho 12-624	10237	38.9	263	2.10 -	37208
Ho 12-625	11052	39.8	278 +	2.05 -	38569 +
Ho 12-626	11250	43.8	255	1.95 -	45602 +
Ho 12-627	12839	47.4	271 +	2.52	37964
Ho 12-628	10890	45.0	243	1.95 -	46736 +
Ho 12-630	12440	45.0	276 +	2.85	31536
Ho 12-632	11151	41.8	265	2.70	30931
Ho 12-633	12596	49.9	253	2.63	38418 +
Ho 12-635	12955	45.6	283 +	2.06 -	44316 +
Ho 12-638	11299	42.7	264	2.28 -	37434
HoCP 12-640	11782	46.6	253	2.30 -	41518 +
HoCP 12-641	12277	47.6	255	2.33 -	41140 +
HoCP 12-643	11870	46.0	256	2.81	32821
HoCP 12-647	11720	43.3	271 +	2.16 -	40157 +
HoCP 12-649	13391 +	49.1	271 +	2.67	36678
HoCP 12-650	11362	40.9	278 +	2.41	33956
HoCP 12-653	10489	40.2	258	1.97 -	40838 +
HoCP 12-654	10231	38.3	267	2.46	31687
HoCP 12-655	10054	35.8 -	275 +	1.93 -	37434
HoCP 12-656	11434	41.9	272 +	2.48	33804
HoCP 12-658	9862	37.8	259	1.69 -	44921 +
HoCP 12-659	9699	36.9	263	2.20 -	33880

Table 21. (Continued)

Variety	Sugar/ acre		Tons/ acre		Sugar/ ton		Weight/ stalk		Stalks/ acre	
	(lbs.)		(tons)		(lbs.)		(lbs.)		(no.)	
HoCP 12-660	13797	+	51.2		268		3.05		33956	
HoCP 12-661	10262		35.8	-	286	+	2.18	-	32594	
HoCP 12-662	11177		42.2		263		1.97	-	42199	+
HoCP 12-666	10848		46.1		235	-	2.81		33124	
HoCP 12-667	13068		48.1		271	+	2.46		39249	+
HoCP 12-669	9303		38.5		241		2.31	-	32973	
HoCP 12-671	11960		45.4		264		2.44		37359	
HoCP 12-673	12048		48.4		249		2.52		38418	+
HoCP 12-675	11734		44.1		266		2.41		36451	
HoCP 12-676	12487		44.7		278	+	2.35	-	37888	
HoCP 12-677	9659		35.6	-	272	+	2.46		29116	
Ho 12-9631[3/]	6821	-	30.4	-	223	-	2.87		21024	-
Ho 12-9632[3/]	10295		41.0		251		3.47	+	23898	-
Ho 12-9633[3/]	10272		38.3		267		2.29	-	33502	
Ho 12-9634[3/]	7852	-	39.0		202	-	2.06	-	38191	+

[3/] Varieties from the SRU's Recurrent Selection for Borers (RSB) program.

2013 LOUISIANA SUGARCANE VARIETY DEVELOPMENT PROGRAM OUTFIELD VARIETY TRIALS

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The outfield variety trials are the final stage of testing experimental varieties for their potential commercial production in Louisiana. Results from these trials are used in both variety advancement and crossing decisions. The outfield variety trials are cooperatively conducted at 12 locations throughout the Louisiana sugarcane belt by the LSU AgCenter, the USDA-ARS, and the American Sugar Cane League.

To be considered for release, an experimental variety must equal or exceed the performance of commercial varieties with regard to yield and harvestability across locations, crops, and years. Accurate varietal evaluation requires overall yield performance information in addition to performance under adverse harvest conditions. The objective of this report is to provide overall and specific location yield data by crop for the 2013 outfield tests. Included are multi-year yield analyses for appropriate test varieties.

The experimental design used at each outfield location was a randomized complete block design with three replications per location. Test plots were two rows wide and 50 feet long with a 5-foot alley between plots. All locations were harvested with a combine harvester and each plot was weighed with a weigh wagon fitted with load cells mounted on each axle and hitch. A 10-stalk, whole-stalk sample, not stripped of leaves, was taken from each plot and sent to the USDA-ARS sucrose laboratory. Samples were hand cut for all tests. The samples were weighed, milled, and the juice analyzed for Brix and pol. Pounds of theoretical recoverable sugar per ton of cane were reported.

Cane yield for each plot was estimated by plot weight, less 14% to adjust for leaf-trash weight and 10% for harvester efficiency. Stalk number was calculated by dividing adjusted cane yield by stalk weight. Adjustments made to cane yield resulted in lower estimated stalk numbers than those achieved by growers.

Interpreting one year of yield data can be misleading because varieties may differ in relative performance from year to year. Across location means can likewise be misleading since a variety, experimental or commercial, may not perform consistently at all locations. Multi-year and multi–location testing solves these problems by averaging the inconsistent performances.

The most widely grown variety in Louisiana in 2013 was HoCP96-540, occupying 39% of the state's acreage. Accordingly for comparison, HoCP96-540 is used as the check variety in all comparisons and is highlighted in the tables. To adjust for missing data, the SAS analysis

calculated least square means (v 9.2, Proc Mixed). Mean separation used least square mean probability differences (P=0.05). Varieties that are significantly higher or lower than HoCP96-540 are denoted by a plus (+) or minus (-), respectively, next to the value for each trait.

Fifteen experimental varieties representing the 2011 assignment series were introduced to outfield locations for seed increase in 2013 (Table 1). Five experimental and seven commercial varieties were planted at 12 outfield locations. Thirty-six tests were harvested in 2013 including eleven plantcane, ten first-stubble, ten second-stubble, and five third-stubble crops (Table 2).

Variety yield traits are reported by crop and trait with overall means and individual location data in the same table and in summary tables by crop. A combined analysis of plantcane, first-stubble, second-stubble, and third-stubble crops averaged over several years is also provided.

The Louisiana sugar industry experienced relatively cool growing conditions during the spring. Rainfall and temperatures during the summer were nearly ideal in most areas of the cane belt, but planting was delayed by 1-2 weeks due to short cane. Thankfully the Louisiana sugar industry was spared of tropical activity in 2013. The 2013 grinding season in Louisiana began in late September. The grinding season was generally wet. On November 28-30, 2013 the growing area experienced sub-freezing temperatures. It was decided not to harvest the plant-cane Alma test for yield. Instead, it was harvested as a cold tolerance test. Despite the freezing conditions, all tests were harvested by the second week of January 2014. The last raw sugar factory ended its processing season on January 10, 2014.

The experimental variety Ho 07-613 was harvested in plantcane through second stubble crops in 2013 and will be considered for release in the spring of 2014.

Data were obtained through a cooperative effort of personnel from the LSU AgCenter, USDA-ARS, Sugarcane Research Laboratory, and the American Sugar Cane League in accordance to the provisions of the "Three-way Agreement of 2007." Outfield testing would not be possible without the full cooperation of the growers at each outfield location.

Table 1. Commercial and experimental varieties planted in the outfield in 2013.

Commercial Varieties		Experimental Varieties		Experimental Varieties Introduced to the Outfield			
HoCP96-540	L01-299	Ho07-613	Ho10-937	L11-168	L11-191	Ho11-515	Ho11-556
L99-226	L03-371	HoCP09-804		L11-172	HoCP11-504	Ho11-529	Ho11-573
HoCP00-950	HoCP04-838	HoCP09-840		L11-183	Ho11-511	Ho11-532	HoCP11-576
L01-283		L09-112		L11-187	Ho11-512	HoCP11-548	

Table 2. Harvest and planting dates for all outfield locations harvested in 2013.

Location	Parish	Plantcane			First-stubble		Second-stubble		Third-stubble	
		2013 Planting Date	2013 Harvest Date	2012 Planting Date	2013 Harvest Date	2011 Planting Date	2013 Harvest Date	2010 Planting Date	2013 Harvest Date	2009 Planting Date
A. Landry	Iberville	09/06	01/08~	09/25	**	08/11	**	08/16	**	*
Allains	St. Mary	09/19	11/21	09/27	11/21	08/31	11/21	09/17	11/21	11/19
Alma	Pointe Coupee	08/28	**	08/17	10/17	09/14	10/17	09/13	**	08/31
Bon Secour	St. James	08/29	12/17	09/07	11/06	09/13	12/17	09/15	11/06	09/03
Brunswick	Pointe Coupee	09/04	12/30	09/05	11/15	09/09	11/15	09/02	**	08/27
F. Martin	St. Mary	10/05	12/31	09/26	10/30	09/15	10/30	09/10	**	09/04
Glenwood	Assumption	08/23	12/03	09/24	12/03	09/01	10/10	09/20	10/10	09/02
Lanaux	St. John	09/10	11/20	08/23	11/20	08/31	10/29	09/23	10/29	09/01
Levert-St. John	St. Martin	09/03	12/16	09/06	12/16	09/02	10/31	09/09	**	08/20
Magnolia	Terrebonne	11/05	11/08	09/11	11/08	09/21	**	09/16	**	09/03
Mary	Lafourche	09/17	01/02~	09/12	**	10/11	01/02~	09/24	**	10/21
R. Hebert	Iberia	09/05	12/13	09/25	12/13	09/16	11/05	09/01	11/05	09/22

* No test planted at this location.
** No test harvested at this location.
~ Test harvested in 2014.

Table 3. Plantcane sugar per acre for seven commercial and four experimental varieties at eleven outfield locations in 2013.

	Heavy					Light						
Variety	Allains	F.Martin	Landry	Magnolia	Mary	Bon Secour	Brunswick	Glenwood	Lanaux	R.Hebert	St. John	Mean
	(lbs./A)											
HoCP96-540	8306	10133	8926	9123	7760	8455	6327	7129	7813	9578	8307	8351
L99-226	7378	9227	8392	9153	9397 +	7481	8238 +	9037	8261	9503	9296	8669
HoCP00-950	7589	8493 -	9073	8175	11976 +	8771	5123	8640	9097	11344 +	9306	8872
L01-283	7263	7445 -	8362	7732 -	8311	6365 -	6988	8099	7186	9781	10442 +	7998
L01-299	8806	9831	11514	8994	9267 +	7416	7569	7655	8342	10807	9000	8991
L03-371	9391	9054	9004	8767	9812 +	8163	9106 +	9904	7714	8687	8896	8954
HoCP04-838	8600	8512 -	8955	8797	9174	9218	7125	10603	8955	10385	9469	9072 +
Ho07-613	8342	10106	7749	10319	10638 +	8268	7509	9886	8820	9944	9929 +	9228 +
L09-112	8050	8466 -	8806	8346	9862 +	8243	7259	8652	8443	8230	8120	8410
HoCP09-804	8289	9267	10333	9361	9764 +	9088	8778 +	9393	7758	10403	11020	9405 +
Ho09-840	7799	7759 -	8773	8051	8521	9204	7995 +	9199	7477	8654	9184	8420

Table 4. Plantcane cane yield for seven commercial and four experimental varieties at eleven outfield locations in 2013.

	Heavy					Light						
Variety	Allains	F.Martin	Landry	Magnolia	Mary	Bon Secour	Brunswick	Glenwood	Lanaux	R.Hebert	St. John	Mean
	(tons/A)											
HoCP96-540	30.5	36.7	30.1	36.6	33.1	33.0	24.0	29.5	29.0	36.1	32.5	31.9
L99-226	25.5 -	31.7 -	30.7	32.5	35.5	28.0 -	29.7 +	33.4	27.4	31.6 -	33.7	30.9
HoCP00-950	25.2 -	27.8 -	31.8	25.9 -	40.0 +	30.5	18.1 -	30.0	29.9	37.3	33.7	30.0
L01-283	25.8	26.8 -	29.0	27.1 -	32.3	22.6 -	24.7	30.1	24.7	35.8	39.3 +	28.9 -
L01-299	32.6	35.4	37.2 +	33.8	36.2	30.0	31.8 +	30.4	29.7	38.7	35.8	33.7
L03-371	30.8	32.2 -	31.2	31.0 -	36.5	29.7	30.9 +	33.9	25.0	31.4 -	32.5	31.4
HoCP04-838	29.2	31.3 -	34.1	31.6 -	38.7 +	35.3	26.5	40.2	31.6	37.4	37.0 +	33.9
Ho07-613	29.3	35.7	30.6	35.9	38.7 +	30.6	25.7	33.4	29.3	35.2	36.5	32.8
L09-112	32.0	32.9	33.6	34.4	42.2 +	34.4	30.8 +	37.0	32.9	35.1	37.2 +	34.8 +
HoCP09-804	29.9	32.8	36.9 +	32.6	36.0	33.4	31.1 +	37.0	26.8	37.1	41.0 +	34.1
Ho09-840	28.0	28.4 -	33.3	29.2 -	32.7	33.7	29.9 +	34.3	27.5	31.5 -	35.4	31.3

Table 5. Plantcane sugar per ton for seven commercial and four experimental varieties at eleven outfield locations in 2013.

	Heavy					Light						
Variety	Allains	F.Martin	Landry	Magnolia	Mary	Bon Secour	Brunswick	Glenwood	Lanaux	R.Hebert	St. John	Mean
	(lbs./tons)											
HoCP96-540	272	276	297	250	235	256	263	241	269	265	256	262
L99-226	288	292	274	282	265	267	276	271	301 +	300 +	276	281 +
HoCP00-950	301 +	306 +	284	315	299	288 +	284 +	288 +	305 +	304 +	279	296 +
L01-283	282	279	290	286	257	282 +	284 +	270	291	274	266	278 +
L01-299	270	278	309	266	256	247	238 -	254	281	279	251	265
L03-371	306 +	280	289	282	269	275 +	295 +	292 +	307 +	277	274	286 +
HoCP04-838	294 +	272	263	278	238	260	268	264	283	278	256	269
Ho07-613	285	283	251	287	275	270	292 +	296 +	301 +	283	273	281 +
L09-112	253 -	258	262	242	233	240 -	238 -	234	258	233 -	219 -	242 -
HoCP09-804	277	282	280	287	271	272 +	282	256	291	281	269	277 +
Ho09-840	279	274	264	276	261	273 +	267	268	272	274	259	270

Table 6. Plantcane stalk weight for seven commercial and four experimental varieties at eleven outfield locations in 2013.

	Heavy					Light						
Variety	Allains	F.Martin	Landry	Magnolia	Mary	Bon Secour	Brunswick	Glenwood	Lanaux	R.Hebert	St. John	Mean
	(lbs.)											
HoCP96-540	2.63	2.46	2.44	2.37	3.26	2.31	2.03	2.63	2.43	2.68	2.57	2.53
L99-226	2.82	2.90	2.15	2.90 +	2.96	2.44	3.39 +	3.52 +	3.00 +	3.30 +	2.74	2.92 +
HoCP00-950	2.22	2.13	2.39	2.35	2.58	1.85	2.16	2.46	2.12	2.37	2.29	2.26 -
L01-283	2.43	1.82 -	2.10	2.03	1.96 -	1.58 -	1.48 -	2.27	2.07	2.16 -	1.64 -	1.96 -
L01-299	2.00 -	2.12	2.66	2.07	2.59	2.26	2.10	2.42	2.33	2.28	2.33	2.28 -
L03-371	2.23	2.39	1.98 -	2.35	2.64	1.71 -	1.85	2.42	2.00	2.77	1.99 -	2.21 -
HoCP04-838	1.91 -	2.61	1.99 -	2.25	2.46 -	2.06	2.01	2.39	2.67	2.06 -	2.69	2.28 -
Ho07-613	2.11	2.70	2.71	2.30	3.19	2.51	1.92	2.50	2.20	2.82	2.23	2.47
L09-112	3.15	2.95 +	2.51	2.82	3.47	3.02 +	2.41 +	3.47 +	2.73	2.56	3.14 +	2.94 +
HoCP09-804	1.68 -	1.84 -	1.75 -	1.96	2.16 -	1.78	1.80	2.16	1.74 -	1.83 -	1.85 -	1.87 -
Ho09-840	1.79 -	1.93 -	1.74 -	1.89 -	2.78	1.56 -	1.30 -	1.94 -	2.33	1.63 -	1.57 -	1.86 -

Table 7. Plantcane stalk number for seven commercial and four experimental varieties at eleven outfield locations in 2013.

	Heavy					Light						
Variety	Allains	F.Martin	Landry	Magnolia	Mary	Bon Secour	Brunswick	Glenwood	Lanaux	R.Hebert	St. John	Mean
	(stalks/A)											
HoCP96-540	23228	30369	25090	31258	20358	29638	23803	23240	23901	27092	25796	25798
L99-226	18301	22007	29527	22445 -	24251	23069	17753 -	19151	18339	19479	24610	21721 -
HoCP00-950	22658	26411	26928	22520 -	31101 +	33684	16753 -	24619	28365	32126	29480	26786
L01-283	21335	29399	27548	27509	32901 +	28657	33499 +	26578	24430	33091	48282 +	30293 +
L01-299	33922 +	35061	28030	33990	27998 +	26628	30266 +	25257	26208	35698 +	30985	30448 +
L03-371	27654	27189	32015	26375	27905 +	34812	33337 +	27820	25140	23044	33088 +	28944
HoCP04-838	31188 +	24494	34497 +	28083	31807 +	34515	26459	34392 +	23898	36483 +	27945	30342 +
Ho07-613	28337	26742	22683	31211	24542	24619	26892	26635	27416	25556	32832 +	27042
L09-112	21000	22344	26877	24835	24612	23569	25977	21485	24056	27545	23758	24196
HoCP09-804	35945 +	36341	42090 +	33619	33515 +	38386	34579 +	36531 +	31379	41210 +	44627 +	37111 +
Ho09-840	31506 +	29884	38524 +	31846	25510	44042 +	46235 +	35834 +	23743	38995 +	45969 +	35645 +

Table 8. First-stubble sugar per acre for one experimental and eight commercial varieties at ten outfield locations in 2013.

	Heavy				Light						
Variety	Allains	Alma	F. Martin	Magnolia	Bon Secour	Brunswick	Glenwood	Lanaux	R.Hebert	St.John	Mean
	(lbs./A)										
HoCP96-540	9772	5970	9660	7444	6769	5580	6435	7200	10437	6492	7580
L99-226	9282	6920	8090 -	7545	7312	8885 +	8166 +	7275	10025	9571 +	8307
L99-233	9418	5120	8302 -	6556	7022	10107 +	7142	7838	11365	8869 +	8178
HoCP00-950	9524	7042	8030 -	-------	7320	6918 +	8217 +	6972	12336 +	8822 +	8299
L01-299	9610	7132	9679	7711	7231	8606 +	8134 +	8278	12351 +	8627	8736
L03-371	8589 -	5779	10268	8745	7392	9190 +	6572	7809	9263 -	5815	7942
HoCP04-838	7901 -	4876	7607 -	6760	6286	8640 +	8210 +	7112	11861 +	7602	7685
Ho05-961	7941 -	5905	8123 -	7449	6722	8972 +	7438	7621	11226	10087 +	8149
Ho07-613	9454	7229	8702	8506	7600 +	7213 +	9588 +	7589	9701	8092	8367

Table 9. First-stubble cane yield for one experimental and eight commercial varieties at ten outfield locations in 2013.

	Heavy				Light						
Variety	Allains	Alma	F. Martin	Magnolia	Bon Secour	Brunswick	Glenwood	Lanaux	R.Hebert	St.John	Mean
	(tons/A)										
HoCP96-540	35.1	30.0	30.3	29.0	26.6	22.1	25.8	27.0	35.1	24.5	28.6
L99-226	32.3	31.3	23.7	24.7	24.7	30.1 +	27.1	26.1	33.2	33.4 +	28.7
L99-233	33.4	25.4	26.2	23.6	25.1	34.7 +	26.0	28.3	40.6 +	33.0 +	29.6
HoCP00-950	29.9 -	27.3	23.2	-------	24.0 -	22.8	26.3	23.2	39.4 +	30.4	27.1
L01-299	34.5	34.8	28.7	26.9	28.0	31.7 +	29.9	27.8	41.2 +	31.5	31.5
L03-371	31.2 -	25.8	30.7	29.2	26.9	30.8 +	23.8	25.9	29.5 -	22.6	27.6
HoCP04-838	27.1 -	25.1 -	23.6	23.3	23.2 -	31.6 +	30.7	25.0	40.9 +	28.9	27.9
Ho05-961	27.4 -	27.0	24.7	25.5	25.2	32.5 +	26.6	25.2	37.8	37.4 +	28.9
Ho07-613	33.0	29.0	26.5	27.9	25.3	23.8	32.4	25.9	32.2	28.6	28.4

Table 10. First-stubble sugar per ton for one experimental and eight commercial varieties at ten outfield locations in 2013.

	Heavy				Light						
Variety	Allains	Alma	F. Martin	Magnolia	Bon Secour	Brunswick	Glenwood	Lanaux	R.Hebert	St.John	Mean
	(lbs./tons)										
HoCP96-540	279	199	319	258	254	253	252	266	300	266	264
L99-226	287	221	341 +	306 +	296 +	296 +	300 +	279	302	287 +	292 +
L99-233	282	202	317	278 +	280 +	291 +	274 +	275	282 -	270	275 +
HoCP00-950	318 +	255 +	346 +	-------	305 +	303 +	313 +	301	313	289 +	306 +
L01-299	279	205	337 +	287 +	258	271	272	298	300	275	278 +
L03-371	275	223	335 +	299 +	274 +	299 +	276 +	301	314	258	285 +
HoCP04-838	292	192	323	291 +	270	273 +	266	285	290	264	275 +
Ho05-961	290	218	329	292 +	266	276 +	281 +	302	298	269	282 +
Ho07-613	287	250 +	328	304 +	300 +	303 +	296 +	292	302	282 +	294 +

Table 11. First-stubble stalk weight for one experimental and eight commercial varieties at ten outfield locations in 2013.

	Heavy				Light						
Variety	Allains	Alma	F. Martin	Magnolia	Bon Secour	Brunswick	Glenwood	Lanaux	R.Hebert	St.John	Mean
						(lbs.)					
HoCP96-540	2.20	2.14	1.82	2.06	2.17	1.95	2.00	2.23	2.11	2.45	2.11
L99-226	2.85 +	2.44	2.10	2.01	2.63	2.59	2.37 +	2.07	2.55	2.65	2.43 +
L99-233	1.96	1.82	1.67	1.95	1.76	2.01	1.37 -	1.53	1.89	1.87 -	1.78 -
HoCP00-950	1.69 -	1.82	1.64	-------	1.87	1.85	1.69	2.13	2.11	1.97	1.85 -
L01-299	2.25	1.82	1.56	1.65 -	2.07	1.79	1.68	2.12	1.73	1.91	1.86 -
L03-371	2.22	1.59 -	2.01	1.80	2.09	1.97	1.96	2.10	2.01	1.84 -	1.96
HoCP04-838	1.92	1.43 -	1.90	1.54 -	1.83	1.87	1.55 -	1.73	2.28	1.80 -	1.78 -
Ho05-961	1.88	1.81	1.59	1.67 -	1.74	1.90	1.74	2.13	2.27	2.19	1.89 -
Ho07-613	2.20	1.75 -	1.91	1.85	2.12	2.00	1.75	2.44	2.13	2.27	2.04

Table 12. First-stubble stalk number for one experimental and eight commercial varieties at ten outfield locations in 2013.

	Heavy				Light						
Variety	Allains	Alma	F. Martin	Magnolia	Bon Secour	Brunswick	Glenwood	Lanaux	R.Hebert	St.John	Mean
						(stalks/A)					
HoCP96-540	32312	28484	33435	28469	26356	22988	25808	24396	34241	20079	27680
L99-226	22697	25626	23190	24819	18757	23861	23190	28562	26777	25199	24268
L99-233	35072	27996	34695	24305 -	30278	34422 +	37918 +	39051	43057	35426	34245
HoCP00-950	36591	30031	28830	-------	25775	24742	31195	22339	38096	30843	29765
L01-299	31005	38167 +	38138	32659 +	27143	35816 +	35592 +	27496	47884 +	32800	34670
L03-371	28100	32453	30566	32727 +	25798	31243	24452	24862	30006	27374	28758
HoCP04-838	29206	36045 +	26044	31240	25901	34286 +	40028 +	28898	36172	33229	32105
Ho05-961	29533	29951	31413	30883	30016	35997 +	30765	23884	33507	34224	31017
Ho07-613	30082	33165	27665	30231	24772	24313	37185 +	22100	31255	25407	28618

Table 13. Second-stubble sugar per acre for one experimental and nine commercial varieties at ten outfield locations in 2013.

	Heavy					Light					
Variety	Allains	Alma	F. Martin	Mary	Bon Secour	Brunswick	Glenwood	Lanaux	R.Hebert	St.John	Mean
	(lbs./A)										
HoCP96-540	7354	6712	6559	6416	6393	10778	5111	5021	8686	8142	7117
L99-226	8912	5792	8081 +	6259	6375	10374	5552	5094	8300	8610	7335
L99-233	7379	5246 -	8614 +	7849 +	7050	9244	5700	5479	9555	9326	7543
HoCP00-950	8057	5735	8029 +	8165 +	6947	8784	5901	5364	10355 +	9538 +	7725
L01-283	8964	6763	9738 +	7555	6498	10304	6428 +	5729	9649	9673 +	8130 +
L01-299	9751 +	8643 +	10778 +	9569 +	7825 +	11804	6585 +	6305 +	11276 +	10810 +	9334 +
L03-371	6574	6378	9181 +	8986 +	7221	8906	6125 +	5095	8983	8365	7583
HoCP04-838	8535	6523	8231 +	7511	7661 +	10268	5825	4816	9759	7546	7667
Ho05-961	7277	7927	7146	8509 +	7152	11070	6786 +	6485 +	-------	9751 +	8197 +
Ho07-613	8501	7190	8344 +	6885	7355 +	8601	6563 +	5393	8740	6659 -	7423

Table 14. Second-stubble cane yield for one experimental and nine commercial varieties at ten outfield locations in 2013.

	Heavy					Light					
Variety	Allains	Alma	F. Martin	Mary	Bon Secour	Brunswick	Glenwood	Lanaux	R.Hebert	St.John	Mean
	(tons/A)										
HoCP96-540	26.6	30.8	25.1	24.8	24.2	32.0	25.4	19.5	30.4	26.6	26.5
L99-226	28.9	28.2	22.9	22.2	21.6	31.1	24.9	17.4	29.9	26.2	25.3
L99-233	25.7	24.9 -	26.5	29.3	26.6	30.9	26.9	19.4	34.9	30.1	27.5
HoCP00-950	24.9	20.5 -	24.7	26.5	24.0	27.3 -	23.8	17.8	36.2 +	29.3	25.8
L01-283	29.4	30.2	29.8	28.4	22.1	31.0	27.9	19.7	35.4	30.7	28.5
L01-299	34.2 +	37.4 +	32.2 +	35.8 +	28.4 +	40.0 +	31.4 +	22.0	40.9 +	36.1 +	33.8 +
L03-371	22.7	30.3	27.0	32.1 +	25.4	27.7	28.9 +	17.5	30.8	26.2	26.9
HoCP04-838	28.9	28.2	26.8	29.9 +	28.6 +	32.5	27.5	16.7	33.9	26.2	27.9
Ho05-961	25.2	31.2	22.0	32.3 +	25.5	36.4	28.1	22.9 +	-------	31.6 +	29.0 +
Ho07-613	27.9	28.8	26.4	25.7	25.1	26.2 -	28.6 +	18.6	30.5	20.9 -	25.9

Table 15.Second-stubble sugar per ton for one experimental and nine commercial varieties at ten outfield locations in 2013.

	Heavy					Light				
Variety	Allains	Alma	F. Martin	Mary	Bon Secour	Brunswick	Glenwood	Lanaux	R.Hebert	St.John	Mean
	(lbs./tons)										
HoCP96-540	277	218	261	257	265	337	201	258	285	307	267
L99-226	308 +	205	353 +	282 +	294 +	334	223	294 +	278	329 +	290 +
L99-233	287	210	325 +	268	265	299	212	282 +	274	310	273
HoCP00-950	324 +	280 +	327 +	308 +	289 +	321	248 +	302 +	288	325 +	300 +
L01-283	305 +	224	327 +	266	294 +	333	230 +	290 +	275	315	286 +
L01-299	286	232	336 +	267	275	293	210	287 +	276	299	276
L03-371	289	210	340 +	281 +	284 +	322	212	290 +	291	319	284 +
HoCP04-838	295 +	232	307 +	251	267	315	213	289 +	288	289	275
Ho05-961	289	254 +	325 +	264	280	305	242 +	283 +	-------	308	283 +
Ho07-613	304 +	247 +	318 +	268	293 +	330	230 +	289 +	287	319	288 +

Table 16. Second-stubble stalk weight for one experimental and nine commercial varieties at ten outfield locations in 2013.

	Heavy					Light				
Variety	Allains	Alma	F. Martin	Mary	Bon Secour	Brunswick	Glenwood	Lanaux	R.Hebert	St.John	Mean
	(lbs.)										
HoCP96-540	2.11	1.86	2.11	1.83	2.38	1.96	1.66	1.90	1.85	2.09	1.98
L99-226	2.12	2.25	2.19	2.19	2.08	2.23	1.90	2.33	2.20	2.31	2.18 +
L99-233	1.65 -	1.74	1.66 -	1.57	1.69 -	1.68	1.22 -	1.76	2.03	1.74	1.67 -
HoCP00-950	1.57 -	1.77	1.70	1.60	1.90 -	1.70	1.30	1.66	1.92	1.67	1.68 -
L01-283	1.61 -	1.81	1.55 -	1.28 -	1.54 -	1.43 -	1.46	1.57	1.79	1.68	1.57 -
L01-299	1.80	1.82	1.78	1.74	1.76 -	2.04	1.22 -	1.67	1.53	1.87	1.72 -
L03-371	2.03	2.03	1.75	1.92	2.16	1.69	1.24 -	1.89	2.01	1.80	1.85
HoCP04-838	1.49 -	1.61	1.77	1.59	1.74 -	1.73	1.27	1.78	1.86	1.69	1.65 -
Ho05-961	1.80	1.72	1.78	1.86	1.94 -	1.93	1.58	1.85	-------	1.95	1.84 -
Ho07-613	1.67 -	1.73	1.86	1.85	2.19	1.81	1.32	2.03	2.19	1.83	1.85

Table 17. Second-stubble stalk number for one experimental and nine commercial varieties at ten outfield locations in 2013.

	Heavy				Light						
Variety	Allains	Alma	F. Martin	Mary	Bon Secour	Brunswick	Glenwood	Lanaux	R.Hebert	St.John	Mean
						(stalks/A)					
HoCP96-540	25114	3310	24531	27162	20249	32566	30727	21011	33229	26762	27445
L99-226	27317	2535	21682	21122	20894	28023	26906	15465	28358	23117	23824 -
L99-233	31404	2960	32564 +	37509 +	31827 +	37277	45340 +	23363	35074	35191 +	33931 +
HoCP00-950	32404	2271	29762	33156	25307	32030	36561	23284	38675	35385 +	31443 +
L01-283	37004 +	3354	40266 +	44900 +	28953 +	43771 +	39426	25961	39869	37047 +	37074 +
L01-299	38156 +	4234 +	36594 +	41980 +	32817 +	40219	51500 +	26518	53559 +	39194 +	40288 +
L03-371	22919	2995	31250	33715	23635	32843	46880 +	18376	31567	29623	30109
HoCP04-838	41260 +	3528	31301	37863 +	32933 +	37722	44042 +	19544	37805	30969	34873 +
Ho05-961	28105	3633	24724	35256	26514 +	38110	35414	25199	-------	32362	31780 +
Ho07-613	34079	3327	28405	28018	23315	29333	46804 +	18449	28351	23020	29305

Table 18. Third-stubble sugar per acre for eight commercial varieties at five outfield locations in 2013.

	Heavy		Light			
Variety	Allains	Bon Secour	Glenwood	Lanaux	R.Hebert	Mean
			(lbs./A)			
HoCP96-540	9991	5960	5137	5282	7540	6782
L99-226	8632	6654	5700	5655	7182	6765
L99-233	7495 -	6948	5411	6697	7848	6880
HoCP00-950	6057 -	6833	5456	6726	9519 +	6918
L01-283	10089	6709	6270	6790	8026	7577
L03-371	-------	7266	6256	7090	7021	7150
HoCP04-838	7251 -	6780	5513	6584	7668	6759
Ho05-961	6695 -	6733	5272	7177	8611	6897

Table 19. Third-stubble cane yield for eight commercial varieties at five outfield locations in 2013.

	Heavy		Light		
Variety	Allains	Bon Secour	Glenwood	Lanaux	R.Hebert	Mean
			(tons/A)			
HoCP96-540	34.7	22.4	19.2	21.1	29.0	25.3
L99-226	28.8	21.3	20.2	20.8	25.7	23.4
L99-233	25.6 -	25.8 +	19.4	24.7	29.6	25.0
HoCP00-950	18.7 -	23.1	18.0	21.6	31.5	22.6
L01-283	31.6	21.9	22.1	24.4	28.2	25.6
L03-371	-------	25.2 +	22.5	23.9	25.1	24.7
HoCP04-838	25.1 -	24.0	20.5	23.4	27.3	24.0
Ho05-961	23.4 -	24.1	19.0	24.1	31.2	24.3

Table 20. Third-stubble sugar per ton for eight commercial varieties at five outfield locations in 2013.

	Heavy		Light		
Variety	Allains	Bon Secour	Glenwood	Lanaux	R.Hebert	Mean
			(lbs./tons)			
HoCP96-540	288	266	267	250	260	266
L99-226	300	313 +	282	272	279 +	289 +
L99-233	293	268	279	269	265	275
HoCP00-950	323 +	296 +	303 +	310 +	301 +	307 +
L01-283	320 +	306 +	284	278	285 +	295 +
L03-371	-------	287	279	297 +	279 +	289 +
HoCP04-838	289	283	270	283 +	282 +	281 +
Ho05-961	290	281	277	297 +	276	284 +

Table 21. Third-stubble stalk weight for eight commercial varieties at five outfield locations in 2013.

	Heavy			Light		
Variety	Allains	Bon Secour	Glenwood	Lanaux	R.Hebert	Mean
			(lbs.)			
HoCP96-540	1.81	2.04	1.27	2.25	2.02	1.88
L99-226	2.24 +	2.07	1.52	2.17	2.35	2.07 +
L99-233	1.54	1.54 -	1.23	1.53	1.74	1.52 -
HoCP00-950	1.46 -	1.66 -	1.22	1.61	1.62 -	1.51 -
L01-283	1.52	1.59 -	1.18	1.56	1.49 -	1.47 -
L03-371	-------	1.93	1.39	2.13	1.83	1.83
HoCP04-838	1.66	1.47 -	1.16	1.69	1.57 -	1.51 -
Ho05-961	1.65	1.80	1.10	2.03	1.54 -	1.62 -

Table 22. Third-stubble stalk number for eight commercial varieties at five outfield locations in 2013.

	Heavy			Light		
Variety	Allains	Bon Secour	Glenwood	Lanaux	R.Hebert	Mean
			(stalks/A)			
HoCP96-540	38516	22075	31434	19263	28971	28052
L99-226	25886 -	20630	26803	19435	21748	22900
L99-233	33124	33754 +	31323	32168	34233	32921
HoCP00-950	26924 -	28053 +	29691	28159	39885 +	30542
L01-283	41981	27883 +	37322	33791	38540 +	35903 +
L03-371	-------	26298	32226	23467	27758	27742
HoCP04-838	30339	32636 +	37006	28202	35572	32757
Ho05-961	28456 -	26808	34658	26036	41007 +	31393

Table 23. Plantcane means from eleven outfield locations in 2013: Allains, Bon Secour, Brunswick, F. Martin, Glenwood, Lanaux, Landry, Magnolia, Mary, R. Hebert and St. John.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
HoCP96-540	8351		31.9		262		2.53		25798	
L99-226	8669		30.9		281	+	2.92	+	21721	-
HoCP00-950	8872		30.0		296	+	2.26	-	26786	
L01-283	7998		28.9	-	278	+	1.96	-	30293	+
L01-299	8991		33.7		265		2.28	-	30448	+
L03-371	8954		31.4		286	+	2.21	-	28944	
HoCP04-838	9072	+	33.9		269		2.28	-	30342	+
Ho07-613	9228	+	32.8		281	+	2.47		27042	
L09-112	8410		34.8	+	242	-	2.94	+	24196	
HoCP09-804	9405	+	34.1		277	+	1.87	-	37111	+
Ho09-840	8420		31.3		270		1.86	-	35645	+

Table 24. First-stubble means from ten outfield locations in 2013: Allains, Alma, Bon Secour, Brunswick, F. Martin, Glenwood, Lanaux, Magnolia, R. Hebert and St. John.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
HoCP96-540	7580		28.6		264		2.11		27680	
L99-226	8307		28.7		292	+	2.43	+	24268	
L99-233	8178		29.6		275	+	1.78	-	34245	+
HoCP00-950	8299		27.1		306	+	1.85	-	29765	
L01-299	8736	+	31.5	+	278	+	1.86	-	34670	+
L03-371	7942		27.6		285	+	1.96		28758	
HoCP04-838	7685		27.9		275	+	1.78	-	32105	+
Ho05-961	8149		28.9		282	+	1.89	-	31017	
Ho07-613	8421		28.6		294	+	2.04		28578	

Table 25. Second-stubble means from ten outfield locations in 2013: Allains, Alma, Bon Secour, Brunswick, F. Martin, Glenwood, Lanaux, Mary, R. Hebert and St. John.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
HoCP96-540	7117		26.5		267		1.98		27445	
L99-226	7335		25.3		290	+	2.18	+	23824	-
L99-233	7543		27.5		273		1.67	-	33931	+
HoCP00-950	7725		25.8		300	+	1.68	-	31443	+
L01-283	8130	+	28.5		286	+	1.57	-	37074	+
L01-299	9334	+	33.8	+	276		1.72	-	40288	+
L03-371	7583		26.9		284	+	1.85		30109	
HoCP04-838	7667		27.9		275		1.65	-	34873	+
Ho05-961	8197	+	29.0	+	283	+	1.84	-	31780	+
Ho07-613	7423		25.9		288	+	1.85	-	29305	

Table 26. Third-stubble means from five outfield locations in 2013: Allains, Bon Secour, Glenwood, Lanaux. And R.Hebert

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
HoCP96-540	6782	25.3	266	1.88	28052
L99-226	6765	23.4	289 +	2.07 +	22900
L99-233	6880	25.0	275	1.52 -	32921
HoCP00-950	6918	22.6	307 +	1.51 -	30542
L01-283	7577	25.6	295 +	1.47 -	35903 +
L03-371	7150	24.7	289 +	1.83	27742
HoCP04-838	6759	24.0	281 +	1.51 -	32757
Ho05-961	6897	24.3	284 +	1.62 -	31393

Table 27. Combined plantcane means across outfield locations from 2009 to 2013.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
HoCP96-540	8351	31.9	262	2.53	25798
L99-226	8669	30.9	281 +	2.92 +	21721 -
HoCP00-950	8872	30.0	296 +	2.26 -	26786
L01-283	7998	28.9 -	278 +	1.96 -	30293 +
L01-299	8990	33.7	265	2.28 -	30424 +
L03-371	8954	31.4	286 +	2.21 -	28944
HoCP04-838	9072	33.9	269	2.28 -	30342 +
Ho07-613	9228 +	32.8	281 +	2.47	27042
L09-112	8410	34.8	242 -	2.94 +	24196 -
HoCP09-804	9405 +	34.1	277	1.87 -	37111 +
Ho09-840	8420	31.3	270	1.86 -	35645 +

Table 28. Combined first-stubble means across outfield locations from 2010 to 2013.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
HoCP96-540	7580	28.6	264	2.11	27680
L99-226	8307	28.7	292 +	2.43 +	24268
L99-233	8178	29.6	275 +	1.78 -	34245 +
HoCP00-950	8299	27.1	306 +	1.85 -	29765
L01-299	8736	31.5	278 +	1.86 -	34670 +
L03-371	7942	27.6	285 +	1.96	28758
HoCP04-838	7685	27.9	275 +	1.78 -	32105 +
Ho05-961	8149	28.9	282 +	1.89 -	31017
Ho07-613	8367	28.4	294 +	2.04	28618

Table 29. Combined second-stubble means across outfield locations from 2011 to 2013.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
HoCP96-540	7117		26.5		267		1.98		27445	
L99-226	7335		25.3		290	+	2.18	+	23824	+
L99-233	7543		27.5		273		1.67	-	33931	+
HoCP00-950	7725		25.8		300	+	1.68	-	31443	+
L01-283	8130	+	28.5		286	+	1.57	-	37074	+
L03-371	9334	+	33.8	+	276		1.72	-	40288	+
HoCP04-838	7583		26.9		284	+	1.85		30109	
Ho05-961	7667		27.9		275		1.65	-	34873	+
Ho07-613	8197	+	29.0	+	283	+	1.84	-	31780	+

Table 30. Combined third-stubble means across outfield locations from 2012 to 2013.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)	(tons/A)	(lbs/ton)		(lbs)		(stalks/A)	
HoCP96-540	6782	25.3	266		1.88		28052	
L99-226	6765	23.4	289	+	2.07	+	22900	
L99-233	6880	25.0	275		1.52	-	32921	
HoCP00-950	6918	22.6	307	+	1.51	-	30542	
L01-283	7577	25.6	295	+	1.47	-	35903	+
L03-371	7150	24.7	289	+	1.83		27742	
HoCP04-838	6759	24.0	281	+	1.51	-	32757	
Ho-05-961	6897	24.3	284	+	1.62	-	31393	

SUCROSE LABORATORY AT THE SUGAR RESEARCH STATION

Gert Hawkins, Michael Pontif and Collins Kimbeng
Sugar Research Station

The Sugar Research Station sucrose laboratory processed 2,852 samples during the 2013 harvest season (Table 1). Standard laboratory procedures were used to analyze 513 samples of which 181 were also processed through the Spectracane FT-NIR instrument. The juice was extracted via a Honiron sugarcane hydraulic press. Procedures included the use of Octapol® for clarification, with Brix being measured by refractometer and pol measured by saccharimeter (Autopol 880). The juice was extracted via a three-roller mill for 332 samples. Sucrose percent and theoretical recoverable sugar (lbs/ton of cane) was calculated based on the Brix and pol values. In addition 289 samples of sweet sorghum samples were analyzed for brix only. The juice was extracted via a three-roller mill. The sucrose laboratory processed samples from July 2013 to January 2014.

A total of 2,050 samples were analyzed using the Spectracane FT-NIR instrument of which 162 where sweet sorghum and 55 energy cane samples. The sample was prepared using a Dedini shredder then fed into the Spectracane unit containing NIR technology to analyze the sample for Brix, pol, fiber, moisture, purity, and theoretical recoverable sugar. Samples that were spectral outliers were automatically sent into a bin and reanalyzed using wet chemistry procedures.

Table 1. Number of sugarcane samples processed at the Sugar Research Station sucrose laboratory during the 2013 harvest season.

Unit/Project Area	Leader	Number of Samples
School of Plant, Environmental, and Soil Sciences	Magdi Selim	12
	Brenda Tubana	240
	Jim Wang	26
Iberia Research Station	Sonny Viator	36
Plant Pathology and Crop Physiology	Jeff Hoy	373
Entomology	Gene Reagan	76
LCES	Albert Orgeron	136
LCES (Energy Cane)	Kenneth Gravois	20
LCES (Sugarcane)	Kenneth Gravois	30
Sugar Research Station/Variety Development	Line Trials	528
	Increase	121
	Nursery	389
	Outfield	162
	Genetics	109
Contract Services		108
Audubon Sugar Institute (Energy Cane)	Shyue Lu	35
Audubon Sugar Institute (Sweet Sorghum)	Shyue Lu	162
Rice Research Station (Sweet Sorghum)	Dustin Harrell	16
Iberia Research Station (Sweet Sorghum)	Sonny Viator	213
Entomology (Sweet Sorghum)	Gene Reagan	60
TOTAL		2,852

LAES SUGARCANE TISSUE CULTURE LABORATORY

Q.J.Xie[1], J.L Flynn[1], D. P. Fontenot[1], and K.A.Gravois[2]
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During the 2013-2014 production season, about 25,800 sugarcane plantlets regenerated in the Louisiana Agricultural Experiment Station Sugarcane Tissue Culture Laboratory, were turned over to Certis USA, LLC, Kleentek Div., for transplanting into the greenhouse at Houma. The number of plantlets transplanted for each cultivar are listed in Table one.

Table 1. The number of tissue-culture-derived plantlets of different cultivars transplanted in the greenhouse.

Cultivar	Number of plantlets
HoCP 96-540	3,888
HoCP 04-838	4,608
L 99-226	3,413
L 01-299	8,136
L 01-283	2,448
HoCP 07-613	3,312
TOTAL	25,805

THE 2013 LOUISIANA SUGARCANE VARIETY SURVEY

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Each year a sugarcane variety survey is conducted by the county agents in the 23 sugarcane-growing parishes of Louisiana to determine the variety makeup and distribution across the state. There were no parish survey reports from Acadia, Cameron, Evangeline, St. Landry, or St. Charles parishes. The information presented in this survey was summarized from 18 individual parish reports. According to USDA Farm Service Agency (FSA), there were 440,010 acres planted to sugarcane in Louisiana in 2013. This survey was based on 97.1 percent of the acres reported by USDA-FSA.

Agents collected acreage according to variety and crop. Eleven sugarcane varieties, LCP 85-384, HoCP 85-845, HoCP 96-540, L 99-226, L 99-233, HoCP 00-950, L 01-283, L 01-299, L 03-371, HoCP 04-838, and Ho 05-961 were listed along with "Others" in the survey. The category of "Others" included, but was not limited to, small acreages of L 97-128, CP 89-2143, HoCP 91-555, Ho 95-988 and small increase acreages devoted to the experimental variety Ho 07-613, which was grown on primary and secondary seed-cane increase stations. The crop was divided into four categories, which included plant-cane, first-stubble, second-stubble and third-stubble and older crops. Additional information regarding parish acreage was collected as needed from the local and state FSA offices.

Total State Acreage. Actual area surveyed for each parish, region and the statewide total are shown in Table 1. Statewide, the area planted to sugarcane in 2013 was 440,010 acres according to state FSA records. A total of 427,061 acres comprised the sample for the 2013 variety survey. An estimated 411,409 acres were available for harvest for sugar, assuming 6.5% of the total acres were used for seed-cane.

Sugarcane Distribution by Variety. Statewide sugarcane acreage in percent by variety and crop is shown in Table 2. The leading variety for 2013 was HoCP 96-540, which occupied 39% of the Louisiana sugarcane acreage. This was similar to HoCP 96-540's acreage in 2012 (Gravois and Legendre, 2013). L 99-226 was next in total acreage as it was planted on 17% of the state's acreage. The varieties planted in the next largest areas were L 01-299, L 01-283, L 99-233, HoCP 00-950, L 03-371, and HoCP 04-838 occupying 15%, 10%, 6%, 4%, 3%, and 3% of the state's acreage, respectively. All other varieties in the survey had each 2% or less of the planted area for 2013.

Sugarcane Distribution by Region and Crop. The total sugarcane acreage was highest for Teche region (181,211 acres); followed by the River-Bayou Lafourche region (166,832 acres); then the Northern region at 79,018 acres (Table 3). Total FSA reported sugarcane acreage increased by 12,966 acres in 2013. The largest increase in sugarcane acreage was in Pointe Coupee and Vermilion parishes.

In 2013, 12.2% of the state's acreage was grown as third and older stubble crops, which was 2.1 percentage points higher than 2012. A relatively mild winter during 2011-2012 may have accounted for the slight increase of acreage devoted to older stubble cane. Some growers may have kept more acreage of older stubble cane to take advantage of higher sugar prices. In 2013, 29.3%, 31.0%, and 27.6% of the state's acreage was in a plant-cane, first stubble, and second stubble crops, respectively.

For the current survey, the Teche region had the greatest percentage of plant-cane (30.7%), with the northern region having the lowest percentage of plant-cane (26.7%). For the third and older stubble crops, the Bayou Teche region had the lowest percentage at 10.6%, whereas the northern region had the highest percentage at 17.4%.

Sugarcane Distribution by Variety and Crop for the Three Regions. HoCP 96-540 continued as the leading variety in all crops (plant-cane through third-stubble crops) for all regions in 2013 (Tables 4-6). HoCP 96-540 led the way in plant-cane acreage with 38%, 29%, and 34% of the plant-cane crop in the Bayou Teche, River-Bayou Lafourche and Northern regions, respectively. The percentages for L 01-299 increased in the plant-cane crop for the three regions as it was planted on 23, 28, and 29%, respectively. Although there has been some renewed interest in HoCP 85-845 and LCP 85-384 because of excellent stubbling ability, both varieties were planted on 2% or less of the Louisiana sugarcane acreage. Most of the HoCP 85-845 was planted in the Bayou Teche region.

The largest variety trend in sugarcane acreage was the increased planting of L 01-299 and increased older stubble crops devoted to L 01-299. Growers in the Bayou Teche region planted slightly more L 99-226 (16%) than the two other growing regions. Conversely, the River-Bayou Lafourche and Northern growing areas planted more L 01-283 than the Bayou Teche region, 14 and 9 %, respectively. HoCP 00-950 and L 01-283 are more suited to the better drained sandier soils that provide a less stressful growing environment, plus growers like the early maturity of these varieties.

Variety Trends. HoCP 96-540, released for commercial planting in 2003, now occupies 39% of the state's acreage, which is the same percentage as was grown in 2012. The variety performed well in 2013, despite moderate levels of brown rust. Rust infections were primarily in early planted and seed-cane fields of HoCP 96-540. A majority of the acres of HoCP 96-540 were treated with fungicide, but less fungicide was applied in 2013 than was applied in 2012.

Fungicides provided good control of brown rust, and yields for HoCP 96-540 were very good.

L 99-226 decreased in acreage by 4 percentage points. The stubbling ability of L 99-226 allows the variety to withstand tough harvesting conditions. The variety is difficult to plant due to lodging and the amount of shucks (long leaves) on the variety. L 99-226 is susceptible to brown rust, but had less rust than HoCP 96-540 in 2013. L 99-226 exhibits resistance to the sugarcane borer and its growth habit makes it competitive with most problem weeds.

L 99-233 decreased in acreage in 2013. Field yields of L 99-233 were not good and, the variety does not respond well to ripeners. This variety is no longer recommended for planting.

HoCP 00-950 was released for commercial planting in 2007, and it occupied less acreage than the previous year of cultivation (4% of the state's acreage in 2013). This variety has high sugar per ton of cane and is considered an early maturing variety. HoCP 00-950 does not grow as well in poorly drained areas and seems better suited to the sandier soils in the sugar belt. Some growers have been very pleased with the performance of HoCP 00-950, while others have discontinued its planting.

L 01-283 was released for commercial planting in 2008 and occupied 10% of the state's acreage in 2013. The variety has excellent stubbling ability, good sugar yield and erectness. Naturally occurring, environmentally induced off-types have been increasing in L 01-283. Growers are cautioned to watch the variety closely before making too rapid of an expansion.

L 01-299 was grown on 15% of the state's acreage. This variety was released in 2009 after superior sugar yields were obtained in the outfield variety trials. The variety is known for outstanding stubbling ability and is well suited for some of heavy land. The variety has an erect growth habit. L 01-299 can have difficulty establishing after planting in sandier soils, especially after rainfall just after planting. The variety can pick up smut and growers are encouraged to monitor seed-cane sources for this disease. L 01-299 performed well in all crops for the 2013 grinding season and withstood the harsh winter of 2013-14. This variety will likely be widely planted again in 2014.

L 03-371, released in 2010, was modestly expanded in the industry during the 2013 planting season. The variety is moderately susceptible to brown rust. L 03-371 is very susceptible to the sugarcane borer and should not be planted where insecticides cannot be applied.

HoCP 04-838 was released in 2011. This new variety has very good sugar and cane yield potential, with its most notable attribute being cold tolerance. Field yields for HoCP 04-838 appear promising based on limited acreage in 2013. The fiber content of HoCP 04-838 is just over 13%. Harvesting trials have been conducted with HoCP 04-838, and fiber content can be managed by careful operation of combines. HoCP 04-838 will continue to be expanded more

widely in 2014.

Ho 05-961 was released to the Louisiana sugar industry in 2012. Soon after its release, two diseases were found in the variety: s*ugarcane mosaic virus* and orange rust. It was decided that Ho 05-961 would not be distributed to growers from the secondary seed increase farms. Ho 05-961 is not recommended for planting.

The dominance of a single variety can lead to disease and insect shifts as was the case with brown rust and LCP 85-384 and HoCP 96-540 (Hoy, 2005). It has been fortunate that HoCP 96-540 was grown on less than 50% of the state's acreage each year that it has been planted. This has likely extended the life span of HoCP 96-540. With the release of 11 new sugarcane varieties since 2003, growers are encouraged to continue to plant a more balanced mix of varieties.

ACKNOWLEDGMENTS

We acknowledge the assistance of the county agents for conducting the sugarcane variety survey in their parishes. We also thank the sugarcane growers and/or their consultants who took the time and effort to respond to the survey. We also acknowledge the assistance of the USDA-FSA offices in the sugarcane parishes for certified acreage figures.

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Table 1. Total area planted to sugarcane in Louisiana by region and parish, 2013.[1, 2]

Bayou Teche		River-Bayou Lafourche		Northern	
Parish	**Acres**	**Parish**	**Acres**	**Parish**	**Acres**
Acadia	NAR	Ascension	19,161	Avoyelles	9,697
Calcasieu	251	Assumption	35,140	Evangeline	NAR
Iberia	56,003	Iberville	37,176	Pointe Coupee	43,347
Jeff Davis	1,118	Lafourche	29,469	Rapides	11,023
Lafayette	10,585	St. Charles	NAR	St. Landry	NAR
St. Martin	31,347	St. James	28,953	West Baton Rouge	14,951
St. Mary	47,170	St. John	7,461		
Vermilion	34,737	Terrebonne	9,472		
Total	181,211	Total	166,832	Total	79,018

Total all regions: 427,061

[1]Acreage based on information obtained in variety surveys from 18 parishes by the county agents in 2013

[2] NAR = No acres reported

Table 2. Estimated statewide sugarcane acreage percentage by variety and crop, all regions, 2013.[1]

Variety	Plant-cane	First-stubble	Second-stubble	Third-stubble and older	Total
	----------%----------				
LCP 85-384	<1	<1	<1	2	<1
HoCP 85-845	2	2	1	2	2
HoCP 96-540	34	39	43	43	39
L 99-226	14	19	16	22	17
L 99-233	1	5	9	10	6
HoCP 00-950	3	3	5	8	4
L 01-283	8	7	15	12	10
L 01-299	26	17	6	2	15
L 03-371	5	5	2	<1	3
HoCP 04-838	7	2	<1	<1	3
Ho 05-961	<1	<1	<1	<1	<1
Other	1	2	2	3	2
Total acres Percent of total crop	125,043 29.3	132,261 31.0	118,954 27.6	51,845 12.1	427,061

[1] Based on information obtained in variety surveys from 18 parishes by county agents in 2013.

Table 3. Estimated sugarcane distribution by region and crop, 2013.[1]

Crop	Bayou Teche	River-Bayou Lafourche	Northern	State Total
Plant-cane Area (acres) Percent (%)	55,616 30.7	48,315 29.0	21,100 26.7	125,031 29.3
First-stubble Area (acres) Percent (%)	56,606 31.2	53,398 32.0	22,176 28.1	132,180 31.0
Second-stubble Area (acres) Percent (%)	49,797 27.5	46,135 27.7	22,002 27.8	117,934 27.6
Third-stubble and older Area (acres) Percent (%)	19,187 10.6	18,981 11.4	13,741 17.4	51,909 12.2
Total area (acres) Percent (%)	181,211 42.4	166,832 39.1	79,018 18.5	427,061

[1] Based on information obtained in variety surveys from 18 parishes by county agents in 2013.

Table 4. Estimated area planted to sugarcane in percent by variety and crop for the Bayou Teche region, 2013.[1]

Variety	Plant-cane crop (%)	First-stubble crop (%)	Second-stubble crop (%)	Third-stubble crop & older (%)	Total (%)
LCP 85-384	<1	0	0	0	<1
HoCP 85-845	3	3	3	4	3
HoCP 96-540	38	39	46	43	41
L 99-226	16	23	22	29	21
L 99-233	1	4	7	5	4
HoCP 00-950	4	4	6	7	5
L 01-283	2	2	8	7	4
L 01-299	23	15	5	1	14
L 03-371	4	6	2	<1	4
HoCP 04-838	8	2	<1	<1	3
Ho 05-961	0	<1	<1	<1	<1
Others	<1	1	1	1	1
Totals	100	100	100	100	100

[1] Based on information obtained in variety surveys from 7 parishes by county agents in 2013.

Table 5. Estimated area planted to sugarcane in percent by variety and crop for the River/Bayou Lafourche region, 2013.[1]

Variety	Plant-cane crop (%)	First-stubble crop (%)	Second-stubble crop (%)	Third-stubble crop & older (%)	Total (%)
LCP 85-384	<1	<1	<1	<1	<1
HoCP 85-845	1	1	<1	<1	1
HoCP 96-540	29	34	34	31	32
L 99-226	13	18	14	19	15
L 99-233	1	8	14	21	9
HoCP 00-950	2	3	4	9	4
L 01-283	14	11	21	15	15
L 01-299	28	17	7	2	16
L 03-371	3	3	1	<1	2
HoCP 04-838	7	1	<1	<1	2
Ho 05-961	0	<1	<1	<1	<1
Others	2	3	4	3	3
Totals	100	100	100	100	100

[1] Based on information obtained in variety surveys from 7 parishes by county agents in 2013.

Table 6. Estimated area planted to sugarcane in percent by variety and crop for the Northern region, 2013[1]

Variety	Plant-cane crop (%)	First-stubble crop (%)	Second-stubble crop (%)	Third-stubble crop & older (%)	Total (%)
LCP 85-384	0	0	0	0	0
HoCP 85-845	0	0	0	0	0
HoCP 96-540	34	52	56	59	49
L 99-226	13	12	8	16	12
L 99-233	1	1	<1	3	2
HoCP 00-950	1	2	8	7	4
L 01-283	9	7	18	13	11
L 01-299	29	19	4	1	14
L 03-371	11	6	2	0	5
HoCP 04-838	2	1	<1	0	1
Ho 05-961	<1	<1	<1	0	<1
Others	<1	<1	1	<1	<1
Totals	100	100	100	100	100

[1] Based on information obtained in variety surveys from 4 parishes by county agents in 2013.

Table 7. Louisiana sugarcane variety trends, by variety and years, all regions, 2009- 2013[1]

	Area planted to sugarcane by variety and years (%)					
Variety	**2009**	**2010**	**2011**	**2012**	**2013**	**1 yr. Change**
LCP 85-384	6	1	<1	<1	<1	0
HoCP 85-845	<1	1	1	<1	2	+2
HoCP 96-540	50	48	43	39	39	0
L 99-226	11	17	19	21	17	-4
L 99-233	6	10	11	9	6	-3
HoCP 00-950	2	4	6	6	4	-2
L 01-283	<1	4	8	11	10	-1
L 01-299	<1	1	3	7	15	+8
L 03-371		<1	1	2	3	+1
HoCP 04-838			<1	1	3	+2
Ho 05-961				<1	<1	0
Others	2	1	<1	1	2	+1
Totals	100	100	100	100	100	

[1] Based on annual variety surveys from 18 parishes by county agents, 2009-2013.

YIELD AND FIBER CONTENT OF HIGH-FIBER SUGARCANE CLONES

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In 2008, the LSU AgCenter partnered with Mississippi State University to evaluate high-fiber sugarcane clones (energycane). Dr. Brian Baldwin of Mississippi State University is the coordinator of the Sun Grant proposal: "Regional Biomass Feedstock – Herbaceous Bioenergy Crop Field Trial". These trials are located across the southeastern U.S. with one located at the LSU AgCenter's Sugar Research Station at St. Gabriel, LA.

A yield trial was planted on September 18, 2008 at the Sugar Research Station in St. Gabriel, Louisiana. Seed-cane of five varieties was obtained at the USDA-ARS Sugarcane Research Unit's Ardoyne Farm, and a randomized complete block (four replications) experiment was planted.

Standard cultural practices were followed during the 2009, 2010, 2011, 2012, and 2013 growing seasons. The field trial was harvested on December 16, 2009 for the plant-cane crop; December 2, 2010 for the first stubble crop; December 15, 2011 for the second stubble crop; December 19, 2012 for the third stubble crop; December 11, 2013 for the fourth stubble crop. Plots were combine-harvested and weighed to determine cane yield (tons/acre). A 10-stalk sample was hand-cut out of each plot for a quality analysis. Each sample was then sent to the laboratory to determine Brix by refractometer and pol (Z°) by saccharimeter. Fiber content was determined by the pre-breaker press method (Gravois and Milligan, 1992).

Data were analyzed with SAS (v9.3) software. Replication was considered a random effect; variety was considered a fixed effect. Least square means were estimated and tested for statistical significance (P=0.05) with the PDIFF option of PROC MIXED.

Gravois, K.A. and S.B. Milligan. 1992. Genetic relationships between fiber and sugarcane yield components. Crop Sci. 32:62-67.

Table 1. Plant-cane data obtained from an energycane field trial conducted at the Sugar Research Station in St. Gabriel, Louisiana in 2009.

Variety	Cane Yield		Brix		Fiber Content		Insoluble Solids (Fiber) Weight		Brix Weight	
	tons/ac		%		%		tons/ac		tons/ac	
Ho 02-144	30.5	B	12.5	A	20.6	B	6.27	C	3.86	AB
Ho 02-147	44.2	A	10.7	B	17.8	C	7.87	AB	4.72	A
Ho 06-9001	28.9	B	10.7	B	26.4	A	7.58	ABC	3.10	BC
Ho 06-9002	25.5	B	10.1	BC	25.3	A	6.44	BC	2.56	C
HoCP 72-114	42.8	A	9.2	C	20.7	B	8.84	A	3.96	AB

Table 2. First-stubble data obtained from an energycane field trial conducted at the Sugar Research Station in St. Gabriel, Louisiana in 2010.

Variety	Cane Yield		Brix		Fiber Content		Insoluble Solids (Fiber) Weight		Brix Weight		Moisture Content	
	tons/ac		%		%		tons/ac		tons/ac		%	
Ho 02-144	25.0	C	16.6	A	25.9	B	6.49	D	4.16	C	61.8	C
Ho 02-147	47.0	A	16.9	A	19.5	D	9.15	A	7.94	A	66.9	A
Ho 06-9001	26.0	C	14.1	C	29.7	A	7.70	BC	3.67	C	60.4	D
Ho 06-9002	24.4	C	14.5	BC	29.6	A	7.22	CD	3.54	C	60.2	D
HoCP 72-114	35.8	B	15.1	B	24.0	C	8.58	AB	5.40	B	64.5	B

Table 3. Second-stubble data obtained from an energycane field trial conducted at the Sugar Research Station in St. Gabriel, Louisiana in 2011.

Variety	Cane Yield		Brix		Fiber Content		Insoluble Solids (Fiber) Weight		Brix Weight		Moisture Content	
	tons/ac		%		%		tons/ac		tons/ac		%	
Ho 02-144	55.3	A	15.6	A	23.6	B	12.95	B	8.62	B	64.5	BC
Ho 02-147	72.4	B	16.0	A	18.4	D	13.21	AB	11.47	A	68.6	A
Ho 06-9001	57.2	A	13.5	BC	28.7	A	16.41	A	7.71	B	61.7	C
Ho 06-9002	50.7	A	12.8	C	28.3	A	14.41	AB	6.50	B	62.6	C
HoCP 72-114	57.1	A	14.4	B	22.6	C	12.39	B	8.22	B	66.2	AB

Table 4. Third-stubble data obtained from an energycane field trial conducted at the Sugar Research Station in St. Gabriel, Louisiana in 2012.

Variety	Cane Yield		Brix		Fiber Content		Insoluble Solids (Fiber) Weight		Brix Weight		Moisture Content	
	tons/ac		%		%		tons/ac		tons/ac		%	
Ho 02-144	34.6	B	17.1	AB	23.2	AB	7.99	AB	5.90	B	63.7	B
Ho 02-147	49.7	A	17.9	A	19.6	C	9.74	A	8.89	A	66.0	AB
Ho 06-9001	27.3	C	15.4	BC	24.8	A	6.85	B	4.13	C	63.6	B
Ho 06-9002	28.0	C	14.7	C	25.7	A	7.24	B	4.13	C	63.3	B
HoCP 72-114	39.4	B	13.7	C	21.5	BC	8.46	AB	5.40	B	67.8	A

Table 5. Fourth-stubble data obtained from an energycane field trial conducted at the Sugar Research Station in St. Gabriel, Louisiana in 2013.

Variety	Cane Yield		Brix		Fiber Content		Insoluble Solids (Fiber) Weight		Brix Weight		Moisture Content	
	tons/ac		%		%		tons/ac		tons/ac		%	
Ho 02-144	36.5	A	14.2	A	23.2	B	8.52	A	5.18	AB	65.9	B
Ho 02-147	40.7	A	14.8	A	19.8	C	8.14	A	6.03	A	68.3	A
Ho 06-9001	38.2	A	13.3	B	27.8	A	10.57	A	5.06	AB	62.6	D
Ho 06-9002	28.3	A	12.7	BC	26.4	A	7.41	A	3.61	B	64.3	C
HoCP 72-114	38.0	A	12.3	C	23.1	B	8.75	A	4.68	AB	67.5	A

FREQUENCY AND DISTRIBUTION OF THE BROWN RUST RESISTANCE GENE *BRU*1 IN THE LOUISIANA SUGARCANE GENE POOL

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Abstract

Brown rust, caused by the fungus *Puccinia melanocephala*, poses an increasing threat to sugarcane industries worldwide. Recently, markers R12H16 and 9020-F4 were developed for a major resistance gene *Bru*1 that contributes to a significant proportion of brown rust resistance in multiple sugarcane industries. Marker-assisted screening of Louisiana sugarcane germplasm showed a low frequency (4.3 %, 5 out of 117 clones) of *Bru*1 among sugarcane cultivars and elite breeding clones. Likewise, among progeny of crosses involving wild/exotic germplasm, only 14 out of 208 clones (6.7 %) tested *Bru*1 positive. However, *Bru*1 frequency was higher (28.7 %, 52 out of 181 clones) in wild/exotic germplasm, which indicated that diverse genetic resources are available for *Bru*1 introgression. Commercial *Bru*1-positive cultivar, L 01-299, was resistant to brown rust. However, *Bru*1-positive cultivar, L 10-146, was susceptible while *Bru*1-negative cultivars, such as L 99-233, showed resistance to brown rust. *Bru*1-negative clones with brown rust resistance offer an opportunity to identify alternate sources of resistance, which can be pyramided with *Bru*1 for effective and durable resistance in sugarcane against the changing pathogen.

Key words: Brown rust, Bru1, Louisiana, marker, sugarcane

Introduction

Progress in breeding for brown rust (*Puccinia melanocephala*) resistance is possible since the trait is highly heritable. Development of resistant cultivars is the most viable, sustainable and environment friendly disease management strategy. But, development of new cultivars through conventional breeding takes 10-14 years in sugarcane, and conventional breeding has been primarily reliant upon phenotypic selection. In the case of brown rust, phenotyping relies on the observation and rating of symptom severity resulting from natural infection, which is unpredictable and unreliable. Selection based on molecular markers can reduce the length of the breeding cycle and reliably increase selection efficiency. *Bru*1 was the first well-characterized Mendelian gene described in sugarcane, which was demonstrated to be effective against diverse spore collections of *P. melanocephala*. Recently, a fine mapping of *Bru*1 led to development of two PCR markers, R12H16 and 9020-F4, that can provide efficient molecular diagnosis for *Bru*1 (Costet et al., 2012). The usefulness of these diagnostic markers in positively identifying brown rust resistant phenotypes has subsequently been demonstrated (Costet et al. 2012; Glynn et al. 2013; Racedo et al. 2013). *Bru*1 was associated with resistance in 86 % of 194 clones from diverse locations (Costet et al. 2012). Glynn et al (2013) detected a high frequency of *Bru*1

among Florida clones (42 %), while *Bru*1 was detected in only 7 % of a limited collection of Louisiana clones. *Bru*1 was present in 59 % of the resistant clones in Florida and represents the predominant source of resistance in the current genetic base for crossing (Glynn et al., 2013). Recently, Racedo et al (2013) reported that 49 out of 129 (38 %) sugarcane accessions of Argentina were brown rust resistant, but only eight (16 %) had *Bru*1. Screening of an additional 190 genotypes in Argentina showed that the overall frequency of *Bru*1 was only 7 %.

Marker-assisted screening for *Bru*1 has revealed variable situations in different regional sugarcane industries. As a result of unintentional selection, *Bru*1 is apparently providing the main source of brown rust resistance in some breeding and selection populations but not others. Based on a limited sample, the germplasm from Louisiana may be a population with limited occurrence of *Bru*1 (Glynn et al., 2013). Thorough characterization of the available germplasm in Louisiana is needed to improve understanding of the genetics of this unpredictable host pathogen interaction and develop the most appropriate strategy to breed brown rust resistant cultivars. Here, results are presented for the frequency and distribution of *Bru*1 in the various germplasm sources of the sugarcane breeding programs of Louisiana through an extensive screening by *Bru*1-associated diagnostic markers.

Materials and Methods

Plant materials:

A total of 508 sugarcane clones were screened for the presence of *Bru*1 gene (Tables 1, 2, 3). The cultivars and elite breeding clones (117 clones), currently providing the population for bi-parental crossing in the Louisiana commercial breeding program (Table 1), were screened. In addition, 208 clones representing early generation progeny of crosses produced under the basic breeding program (Table 2) were screened. The basic breeding effort consists of a bi-parental crossing program for gene introgression from wild/exotic germplasm of *Saccharum* species and related genera. The remaining 181 clones screened were the wild/exotic germplasm collected and maintained for basic breeding at the USDA-ARS Sugarcane Research Unit at Houma, Louisiana (Table 3).

Field evaluation of brown rust resistance:

Resistance/susceptibility reactions of the clones included in the study were determined by visual rating of disease severity under natural infection conditions during spring months when brown rust pressure was high in Louisiana. Ratings were assigned on a 1-9 scale in which a rating of 1 was considered highly resistant, 2 was resistant, 3 was moderately resistant, 4 and 5 were considered moderately susceptible, 6 and 7 were susceptible, and 8 and 9 were ratings of highly susceptible. The ratings were assigned based on observation of symptom severity on older and younger leaves of plants in single-row field plots as follows: 1 = little or no symptoms; 2 = few to moderate lesions on older leaves; 3 = moderate lesions on older leaves with a few lesions on young leaves; 4 = moderate lesions on older leaves with necrosis and moderate lesions on some young leaves; 5 = moderate to extensive lesions and necrosis on older leaves and moderate lesions on young leaves; 6 = extensive lesions and necrosis on older leaves and moderate lesions with tip necrosis on young leaves; 7 = extensive necrosis on older leaves and moderate to extensive lesions with tip necrosis on young leaves; 8 = extensive necrosis on older leaves and moderate to extensive lesions with tip necrosis on youngest leaves; 9 = total senescence of older leaves, moderate to extensive lesions on young leaves with extensive necrosis.

Genomic DNA isolation and PCR genotyping:

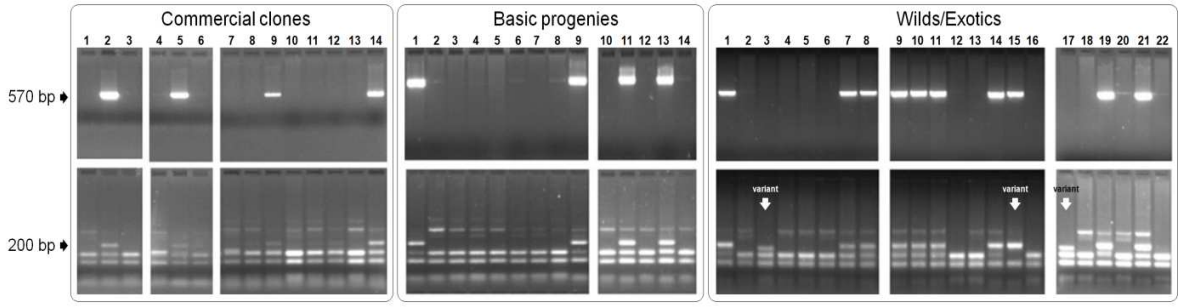
Young fully expanded leaf tissues were collected from the various germplasm sources which were grown in pots on crossing carts (commercial and elite clones), in the greenhouse (commercial and basic cross progeny), and/or historical nurseries (wild/exotic accessions) of the Sugar Research Station, St. Gabriel, Louisiana and Sugarcane Research Unit, USDA-ARS, Houma, Louisiana. Total genomic DNA was isolated from approximately 100 mg of leaf tissue using a CTAB miniprep method (Doyle and Doyle, 1990). Quality and quantity of DNA was determined using a ND-100 spectrophotometer (Nanodrop Technologies Inc, Wilmington, DE). One hundred ng of total DNA was subjected to PCR using the primers R12H16 and 9020-F4 following the method described earlier (Costet et al. 2012). Ten µl of PCR product of marker 9020-F4 was digested with *Rsa*I in a total volume of 20 µl. R12H16 amplicons and 9020-F4/*Rsa*I restriction fragments were resolved on 3 % agarose gels in 1x TAE buffer and stained with ethidium bromide for visualization and documentation in a KODAK Gel Logic 200 Imaging system (Kodak, New Haven, CT).

Results

***Bru*1 detection:**

Presence of *Bru*1 was indicated by a 570 bp amplification product of marker R12H16 or a 200 bp fragment produced after digestion of marker 9024-F4 product with *Rsa*I enzyme (Fig. 1). A few accessions consistently showed a faint band over repeated DNA extractions and PCR tests. For example, *S. spontaneum* clone SH 249 had a faint amplification by marker R12H16, although the 570 bp fragment was cloned from this accession. However, the diagnostic 200 bp band was absent upon digestion of the 9020-F4 PCR product.

Figure 1. Representative gel images showing presence of *Bru*1 gene by the diagnostic fragments for R12H16 and 9020-F4 markers. Commercial clones: #1-14 represent L 01-283, L 01-299, HoCP 09-803, N 27, Nco 310, L 75-056, L 09-123, L09-125, CP 77-310, CP 52-068, LCP 86-454, HoCP 00-950, L 09-129, L 10-146. Basic crosses: #1-14 represent Ho 12-9014, Ho 12-



9015, Ho 12-9016, Ho 12-9017, Ho 12-9018, Ho 12-9019, Ho 12-9020, Ho 12-9021, Ho 12-9022, Ho 12-607, Ho 12-671, Ho 12-672, Ho 12-673, Ho 12-674. Wilds/exotics: #1-22 represent China, CR 93-1007, Coimbatore, CG 00-102, CG 96-52, CR 0026, CR 97-1007, ChukChe, Mcikum, Merthi, MerthiZell, MPTH 97-209, Muntok Java, Matna Shahj, MPTH 97-204, MPTH 97-216, R 65-P67, R 34-P16, Roc 22, Roc 20, Ruckri,, S 66-84B

Marker 9020-F4 amplified a single fragment in all accessions, which produced up to five cleavage products after digestion with *Rsa*I in positive genotypes. In addition to the expected 200-bp diagnostic band for 9020-F4, variant banding patterns were observed in a few wild/exotic

clones (Fig. 1). For example, the fragment was shorter in length in Coimbatore and R65-P67, while a non-diagnostic band was conspicuously absent in MPTH97-204. In both cases, the clones were noted as positive.

Frequency of *Bru*1:

Only five (NCo 310, CP 77-310, L 01-299, Ho 09-827, L 10-146) out of 117 (4.3 %) sugarcane cultivars and elite clones tested were identified as positive for *Bru*1 (Table 1). Among progenies of basic crosses, only 14 out of 208 clones (6.7 %) possessed *Bru*1 (Table 2). In a comparison to the commercial and elite clones and basic cross progenies, a higher frequency of *Bru*1 was detected in the wild/exotic germplasm; 52 out of 181 clones (28.7 %) showed positive PCR/digestion fragments (Table 3). Variant band profiles for marker 9020-F4 were observed mostly among the wild/exotic clones (Fig. 1). Both markers were present in 60 out of 71 positive clones. Eleven genotypes representing progenies of basic crosses and wild/exotic clones exhibited non-correspondence between R12H16 and 9020-F4 markers (Tables 2, 3). Interestingly, all these genotypes, Ho 10-9249, Ho 11-9332, Ho 10-9333, Ho 10-9334, Coimbatore, IMP 8089, IS 76-184, MPTH 97-107, R 65-P67, Tainan and *Erianthus*, were negative for R12H16 but were positive for the 9020-F4/*Rsa*I fragment. However, one *Saccharum sponaneum* clone, Molokai, was found to possess the R12H16-specific band but not the expected 9020-F4/*Rsa*1 fragment.

Association of *Bru*1 with brown rust resistance:

Resistance ratings were made based on natural infection severity for the commercial and elite parental clones (Table 1). Of the five clones that carried *Bru*1, disease data were available for four clones. L 01-299 was highly resistant. Ho 09-827 and NCo 310 were rated as resistant and moderately resistant, respectively. However, clone L 10-146 showed a susceptible reaction (7 rating). On the other hand, three clones, L 99-233 (1 rating), Ho 08-717 (1 rating) and Ho 04-947 (2 rating), were observed to be rust resistant but did not have *Bru*1-specific or variant bands. Also, 17 clones that were moderately resistant (3 rating) were *Bru*1-negative. Altogether, 20 of 103 (19.4 %) of the rated breeding population clones without *Bru*1 exhibited some level of brown rust resistance. In contrast, the overall frequency of resistance was higher (83.1 %) in the rated progeny from basic crosses with 70.8 % of the clones without *Bru*1 exhibiting resistance (Table 2).

Discussion

During the last 15 years in Louisiana, brown rust resistance has been overcome in eight of 11 cultivars (73 %) released for more than 4 years. It is difficult to replace cultivars in sugarcane due to the multiple year crop cycle and long breeding cycle, so when resistance is overcome in cultivars, there is potential for significant economic losses. The discovery of *Bru*1 and development of diagnostic molecular markers provided an opportunity to improve understanding of the host genetics of resistance in Louisiana and potentially make breeding resistant cultivars more effective.

The low frequency (4.3 %) of *Bru*1 found in the Louisiana commercial sugarcane breeding pool in this study (Table 1) concurred with the earlier report of Glynn et al. (2013). Pedigree records of the four Louisiana-bred *Bru*1-positive clones (L 01-299, L 10-146, CP 77-310 and Ho 09-827) could not establish any definitive donor ancestry. These four *Bru*1-positive clones were produced during the 1970s or 2000s and established as cultivars in different years.

The Louisiana breeding program has been more self-contained because sugarcane is grown at the northern limit of the cultivation range, and cultivars must have very early maturity to be grown successfully. This could account for the low frequency of *Bru*1. NCo 310, a widely cultivated old cultivar originating in South Africa, is closely related to the interspecific hybrid founders used to establish modern sugarcane industries and breeding programs around the world. It is likely that *Bru*1 was inherited from a common progenitor used in the creation of the interspecific hybrid founders; however, NCo 310 was not used extensively as a parent in Louisiana. Basic breeding to introgress genes from wild/exotic germplasm has been more extensively utilized in Louisiana due to the short season and stressful growing conditions. Recent successful cultivars of Louisiana, LCP 85-384, 'HoCP 85-845', 'L 97-128', and HoCP 96-540, that all tested negative for *Bru*1, had a common *S. spontaneum* progenitor, US 56-15-8, which also tested *Bru*1-negative.

Low frequency of *Bru*1 in the Louisiana commercial cultivars and elite clones may be related to the fact that a number of Louisiana sugarcane cultivars have become susceptible to brown rust while under cultivation. There are resistant clones in the current parent population. However, the frequency is low (23.6 %) and only three without *Bru*1, L 99-233, Ho 08-717, and Ho 04-947, exhibited a high level of resistance under high natural infection pressure. In Argentina, 87 % of brown rust resistant accessions did not contain *Bru*1 (Racedo et al., 2013), while in Guatemala, approximately one third of the resistant clones contained *Bru*1 (Molina et al., 2013). In contrast, the frequency of *Bru*1 in the resistant commercial and elite clones was only 13 % in Louisiana. L 01-299 is the only *Bru*1-positive commercial cultivar, and it has shown a high level of brown rust resistance. Interestingly, 70.8 % of rated clones from basic breeding program crosses that did not have *Bru*1 showed moderate to high levels of resistance to brown rust. *Bru*1 could be inherited as another haplotype that is not tightly linked to the PCR diagnostic markers used in the present study (Glynn et al., 2013), but the results suggest alternative sources of resistance exist in the Louisiana wild/exotic germplasm that are being introgressed in basic crosses.

Resistance associated with *Bru*1 has been remarkably effective and durable (Asnaghi, et al., 2004; Costet et al. 2012; Glynn et al. 2013), but the unwitting overreliance on *Bru*1 that has occurred in some places will necessitate efforts to diversify resistance to brown rust. In cases such as L 10-146, *Bru*1 activity could be negated by some factors in certain genetic backgrounds. The occurrence of susceptibility in a clone with *Bru*1 is cause for concern.

Louisiana breeders have been unknowingly selecting for sources of resistance other than *Bru*1, and this may involve multiple genes with quantitative resistance effects of variable magnitude in different combinations. The distribution of resistance ratings indicates the quantitative expression of resistance to brown rust. The prevalence of *Bru*1 in the wild/exotic germplasm indicates an opportunity for greater deployment by marker-assisted introgression into the commercial breeding program. Importation of additional genotypes with *Bru*1 and more desirable agronomic characteristics also may be desirable.

Variant banding patterns by *Bru*1-specific markers suggested allelic variations around the *Bru*1 region. Disagreement between R12H16 and 9020-F4 markers, as noted in the progeny of a few basic crosses and in wild/exotic clones (Table 2), were either due to changes in enzyme restriction sites or priming sites because of sequence variations, and a less strong linkage

disequilibrium between the markers. These differ from Racedo et al. (2013) where all *Bru*1-positive clones in Argentina were reported to possess both markers.

Conclusively, our genotyping results showed that *Bru*1-dependent brown rust resistance could and should be exploited to a greater extent in Louisiana commercial sugarcane breeding. Diverse genetic resources for both *Bru*1 and other sources of brown rust resistance are available in wild/exotic germplasm. Shorter term breeding strategy should attempt to improve understanding of the molecular basis of quantitative resistance detected in cultivars, such as L 99-233 (Avellaneda et al., 2013) not having *Bru*1. This presents an opportunity to search for alternative resistance genes which can be combined with *Bru*1 to achieve highly effective more durable horizontal resistance, get out of the current "boom-and-bust" cycle (Preistley, 1978), and avoid one that could result from an overreliance on *Bru*1. Development of markers linked to these alternative brown rust resistance genes will facilitate exploitation within the commercial germplasm and their introgression from wild species of *Saccharum* and related genera into cultivated backgrounds under the base-broadening basic breeding program.

Acknowledgement

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Table 1. *Bru*1 genotyping of 115 Louisiana sugarcane cultivars and breeding lines using R12H16 and 9020-F4 markers, and data on brown rust susceptibility

Clone name[a]	R12H16 marker	9020-F4 marker	Disease response[b]	1-9 rating[b]
CP 52-068	-	-	MS	4
CP 72-370	-	-	MR	3
CP 74-383	-	-	S	6
CP 77-310	+	+		
CP 77-405	-	-	MR	3
CP 77-407	-	-	MR	3
CP 79-318	-	-	MR	3
CP 79-348	-	-	MS	4
CP 83-644	-	-	MS	4
CP 85-830	-	-	MS	4
Ho 89-889	-	-	MS	4
Ho 95-988	-	-	HS	8
Ho 04-847	-	-	R	2
Ho05-961	-	-	MR	3
Ho 06-530	-	-	S	6
Ho 06-563	-	-	S	6
Ho 07-613	-	-	MS	5
Ho 07-617	-	-	MR	3
Ho08-709	-	-	MR	3
Ho 08-711	-	-	MS	4
Ho 08-717	-	-	HR	1
Ho 09-822	-	-	MR	3
Ho 09-824	-	-	MS	4
Ho 09-825	-	-	MS	4
Ho 09-827	+	+	R	2
Ho 09-831	-	-	MS	5
Ho 09-840	-	-	MS	5
Ho 09-841	-	-	MR	3
Ho 12-619	-	-		
Ho 12-661	-	-		
HoCP 85-845	-	-	MS	4
HoCP 89-846	-	-	HS	8
HoCP 91-552	-	-	MS	4
HoCP 92-618	-	-	MS	5
HoCP 92-624	-	-	S	7
HoCP 92-648	-	-	MS	5
HoCP 95-951	-	-	MS	5
HoCP 96-540	-	-	S	6

Table 1. Continue

Clone name[a]	R12H16 marker	9020-F4 marker	Disease response[b]	1-9 rating[b]
HoCP 96-561	-	-	MS	4
HoCP 97-609	-	-	MS	5
HoCP 00-930	-	-	HS	8
HoCP 00-950	-	-	MS	4
HoCP 01-517	-	-	MS	5
HoCP 01-523	-	-	MS	4
HoCP 02-610	-	-	MS	5
HoCP 02-618	-	-	MS	5
HoCP 02-623	-	-	S	6
HoCP 04-838	-	-	MS	5
HoCP 05-902	-	-	MS	5
HoCP 08-726	-	-		
HoCP 09-803	-	-	MR	3
HoCP 09-810	-	-	S	6
HoL 08-723	-	-	MS	4
L 75-056	-	-		
L 94-426	-	-	MS	5
L 94-428	-	-	S	6
L 94-432	-	-	MS	5
L 94-433	-	-	S	7
L 97-128	-	-	MS	4
L 98-207	-	-	HS	8
L 98-209	-	-	S	7
L 99-226	-	-	S	6
L 99-233	-	-	HR	1
L 01-131	-	-		
L 01-281	-	-	S	6
L 01-283	-	-	MS	4
L01-299	+	+	HR	1
L01-315	-	-	S	6
L 05-448	-	-	MR	3
L 05-457	-	-	MR	3
L 05-466	-	-	MS	5
L 05-470	-	-	S	6
L 06-001	-	-	MS	4
L 06-038	-	-	MR	3
L 06-040	-	-	MR	3
L 07-057	-	-	S	6
L 08-088	-	-	MR	3

Table 1. Continue

Clone name[a]	R12H16 marker	9020-F4 marker	Disease response[b]	1-9 rating[b]
L 08-090	-	-	S	6
L 08-092	-	-	MS	4
L 09-099	-	-	MS	4
L 09-105	-	-	MR	3
L 09-107	-	-	MS	5
L 09-108	-	-	MS	4
L 09-112	-	-	MS	4
L 09-114	-	-	MS	5
L 09-117	-	-	S	6
L 09-118	-	-	MS	4
L 09-121	-	-	MS	4
L 09-123	-	-	MS	4
L 09-125	-	-	S	7
L 09-129	-	-	MS	5
L 10-132	-	-	S	7
L10-136	-	-		
L 10-137	-	-		
L 10-142	-	-	MS	5
L 10-144	-	-	MS	4
L 10-145	-	-	MS	5
L 10-146	+	+	S	7
L 10-147	-	-		
L 10-148	-	-	MS	4
L 10-150	-	-	MS	4
L 10-156	-	-	MR	3
L 10-157	-	-		
L 10-158	-	-		
L 10-160	-	-		
L 10-163	-	-		
LCP 81-010	-	-	S	6
LCP 81-030	-	-	MR	3
LCP 82-089	-	-	S	7
LCP 85-376	-	-	MS	5
LCP 85-384	-	-	S	7
LCP 86-454	-	-	MS	4
N 27	-	-	MS	4
NCo 310	+	+	MR	3
TucCP 77-042	-	-	MS	4
US 79-010	-	-	MR	3

Table 1. Continue

Clone name[a]	R12H16 marker	9020-F4 marker	Disease response[b]	
US 01-040	-	-	MS	4

[a] Louisiana cultivars bear the designations: CP, Ho, HoCP, HoL, L, or LCP to indicate the breeding program source; CP = Canal Point (USDA Florida), Ho = Houma (USDA Louisiana), L = Louisiana (LSU). The two-digit number following the letter designation indicates year of establishment. N 27, NCo 310, and TucCP 77-042 are foreign cultivars. N = Natal, South Africa; Co = Coimbator, India; and Tuc = Tucuman, Argentina. US 79-010 and US 01-040 are experimental lines.
[b] 1 = HR (highly resistant), 2 = R (resistant), 3 = MR (moderately resistant), 4 = MS (moderately susceptible), 5 = MS, 6 = S (susceptible), 7 = S, 8 = HS (highly susceptible), and 9 = HS.

Table 2. *Bru*1 genotyping of 210 clones produced from basic crosses, and their susceptibility to brown rust.

Clone namea	R12H16 marker	9020-F4 marker	1-9 ratingb
Ho 08-9507	-	-	
Ho 08-9618	-	-	
Ho 09-821	-	-	
Ho 09-822	-	-	3
Ho 09-830	-	-	
Ho 09-9401	-	-	
Ho 10-9211	+	+	3
Ho 10-9218	-	-	2
Ho 10-9219	-	-	2
Ho 10-9223	-	-	3
Ho 10-9229	-	-	6
Ho 10-9232	-	-	3
Ho 10-9233	-	-	3
Ho 10-9241	-	-	2
Ho 10-9249	-	+	2
Ho 10-9253	-	-	3
Ho 10-9291	-	-	
Ho 10-9292	-	-	
Ho 11-508	-	-	
Ho 11-509	-	-	
Ho 11-510	-	-	
Ho 11-515	-	-	
Ho 11-518	-	-	
Ho 11-524	-	-	
Ho 11-556	-	-	

Table 2. Continue

Clone namea	R12H16 marker	9020-F4 marker	1-9 ratingb
Ho 11-557	-	-	
Ho 11-568	-	-	
Ho 11-571	-	-	
Ho 11-572	-	-	
Ho 12-619	-	-	
Ho 11-9345	-	-	1
Ho 11-9301	-	-	3
Ho 11-9302	-	-	2
Ho 11-9303	+	+	2
Ho 11-9304	+	+	1
Ho 11-9305	+	+	3
Ho 11-9306	-	-	1
Ho 11-9307	-	-	
Ho 11-9308	-	-	2
Ho 11-9309	-	-	4
Ho 11-9310	-	-	2
Ho 11-9311	-	-	2
Ho 11-9312	-	-	2
Ho 11-9313	-	-	2
Ho 11-9314	-	-	4
Ho 11-9315	-	-	2
Ho 11-9316	-	-	1
Ho 11-9317	-	-	3
Ho 11-9318	-	-	2
Ho 11-9319	-	-	
Ho 11-9320	-	-	3
Ho 11-9321	-	-	4
Ho 11-9322	-	-	3
Ho 11-9323	-	-	4
Ho 11-9324	-	-	2
Ho 11-9325	-	-	2
Ho 11-9326	-	-	3
Ho 11-9327	-	-	3
Ho 11-9328	-	-	4
Ho 11-9329	-	-	3
Ho 11-9330	-	-	5
Ho 11-9331	-	-	4
Ho 11-9332	-	+	2
Ho 11-9333	-	+	2

Table 2. Continue

Clone namea	R12H16 marker	9020-F4 marker	1-9 ratingb
Ho 11-9334	-	+	2
Ho 11-9335	-	-	1
Ho 11-9336	-	-	1
Ho 11-9337	-	-	2
Ho 11-9338	-	-	5
Ho 11-9339	-	-	1
Ho 11-9340	-	-	2
Ho 11-9341	-	-	2
Ho 11-9342	-	-	3
Ho 11-9343	-	-	1
Ho 11-9344	-	-	1
Ho 11-9346	-	-	1
Ho 11-9347	-	-	
Ho 11-9348	-	-	3
Ho 11-9349	-	-	3
Ho 11-9350	-	-	2
Ho 11-9351	-	-	1
Ho 11-9352	-	-	2
Ho 11-9353	-	-	3
Ho 11-9354	-	-	3
Ho 11-9403	-	-	2
Ho 11-9404	-	-	5
Ho 11-9405	-	-	
Ho 11-9406	-	-	4
Ho 12-602	-	-	
Ho 12-607	-	-	
Ho 12-607	-	-	
Ho 12-608	-	-	
Ho 12-615	-	-	
Ho 12-616	-	-	
Ho 12-617	-	-	
Ho 12-618	-	-	
Ho 12-620	-	-	
Ho 12-621	-	-	
Ho 12-624	-	-	
Ho 12-625	-	-	
Ho 12-627	-	-	
Ho 12-628	-	-	
Ho 12-630	+	+	

Table 2. Continue

Clone namea	R12H16 marker	9020-F4 marker	1-9 ratingb
Ho 12-631	-	-	
Ho 12-633	-	-	
Ho 12-635	-	-	
Ho 12-640	-	-	
Ho 12-642	-	-	
Ho 12-644	-	-	
Ho 12-651	-	-	
Ho 12-9001	-	-	
Ho 12-9002	-	-	
Ho 12-9003	-	-	
Ho 12-9004	-	-	
Ho 12-9005	-	-	
Ho 12-9006	-	-	
Ho 12-9007	-	-	
Ho 12-9008	-	-	
Ho 12-9009	-	-	
Ho 12-9010	-	-	
Ho 12-9011	-	-	
Ho 12-9012	-	-	
Ho 12-9013	-	-	
Ho 12-9014	+	+	
Ho 12-9050	-	-	
Ho 12-9016	-	-	
Ho 12-9017	-	-	
Ho 12-9018	-	-	
Ho 12-9019	-	-	
Ho 12-9020	-	-	
Ho 12-9021	-	-	
Ho 12-9022	+	+	
Ho 12-9023	-	-	
Ho 12-9024	-	-	
Ho 12-9025	-	-	
Ho 12-9026	-	-	
Ho 12-9027	-	-	
Ho 12-9028	-	-	
Ho 12-9029	-	-	
Ho 12-9030	-	-	
Ho 12-9031	-	-	
Ho 12-9032	-	-	

Table 2. Continue

Clone namea	R12H16 marker	9020-F4 marker	1-9 ratingb
Ho 12-9033	-	-	
Ho 12-9034	-	-	
Ho 12-9035	-	-	
Ho 12-9036	-	-	
Ho 12-9037	-	-	
Ho 12-9038	-	-	
Ho 12-9039	-	-	
Ho 12-9040	-	-	
Ho 12-9041	-	-	
Ho 12-9042	-	-	
Ho 12-9043	-	-	
Ho 12-9044	-	-	
Ho 12-9045	-	-	
Ho 12-9046	-	-	
Ho 12-9047	-	-	
Ho 12-9048	-	-	
Ho 12-9049	-	-	
Ho 12-9051	-	-	
Ho 12-9052	-	-	
Ho 12-9053	-	-	
Ho 12-9054	-	-	
Ho 12-9055	-	-	
Ho 12-9056	-	-	
Ho 12-9057	+	+	
Ho 12-9407	-	-	
Ho 12-9408	-	-	
Ho 12-9409	-	-	
Ho 12-9410	-	-	
Ho 12-9411	-	-	
Ho 12-9631			
Ho 12-9632	-	-	
Ho 12-9633	-	-	
HoCP 01-517	-	-	
HoCP 01-523			
HoCP 09-807	-	-	
HoCP 11-541	-	-	
HoCP 11-542	-	-	
HoCP 12-639	-	-	
HoCP 12-641	-	-	

Table 2. Continue

Clone namea	R12H16 marker	9020-F4 marker	1-9 ratingb
HoCP 12-643	-	-	
HoCP 12-646	-	-	
HoCP 12-647	-	-	
HoCP 12-648	-	-	
HoCP 12-650	-	-	
HoCP 12-653	-	-	
HoCP 12-654	-	-	
HoCP 12-655	-	-	
HoCP 12-656	-	-	
HoCP 12-659	-	-	
HoCP 12-660	-	-	
HoCP 12-662	-	-	
HoCP 12-664	-	-	
HoCP 12-665	-	-	
HoCP 12-666	-	-	
HoCP 12-667	-	-	
HoCP 12-668	-	-	
HoCP 12-670	-	-	
HoCP 12-671	-	-	
HoCP 12-672	-	-	
HoCP 12-673	+	+	
HoCP 12-674	-	-	
HoCP 12-675	+	+	
HoCP 12-676	-	-	
HoCP 12-677	-	-	
Tuc 89-28	-	-	
US 08-9003	-	-	

[a] Louisiana cultivar designations to indicate the breeding program source: Ho, HoCP, LCP, and US; CP = Canal Point (USDA Florida), Ho = Houma (USDA Louisiana), L = Louisiana (LSU), and US = United States (basic germplasm cross). The two-digit number following the letter designation indicates year of establishment. Tuc (Tucuman, Argentina) 89-28 is a foreign cultivar and US 08-9003 is an experimental line.
[b] 1 = highly resistant, 2 = resistant, 3 = moderately resistant, 4 = moderately susceptible, 5 = moderately susceptible, 6 = susceptible, 7 = susceptible, 8 = highly susceptible, and 9 = highly susceptible.

Table 3. *Bru*1 genotyping of 183 wild/exotic clones with two diagnostic markers

Clone	R12H16 marker	9020-F4 marker
Badilla	-	-
Blue Stem	-	-
BR 93-1005	-	-
BR 97-1004	-	-
BR 97-2001	+	+
C 698-46	-	-
CC 84-75	-	-
CG 00-102	-	-
CG 05-10242	+	+
CG 05-12929	-	-
CG 96-52	-	-
CG 96-78	-	-
CG 98-62	-	-
Chin	+	+
China	+	+
Chuan58-181	-	-
ChukChe	+	+
City Park	-	-
Clovelly	-	-
Coimbatore	-	+
CP 88-1165	-	-
CR 00-026	-	-
CR 03-1009	-	-
CR 93-1007	-	-
CR 94-1009	-	-
CR 95-1007	-	-
CR 97-1007	+	+
Dhaula	+	+
Dijatiroto	-	-
Dwarf1	-	-
Dwarf2	-	-
Erianthus	-	+
Erianthus Rav	-	-
Fiji	-	-
Fiji 1	+	+
Fiji 47	-	-
Fiji 49	-	-
Fiji 59	-	-
Floridus	-	-

Table 3. Continue

Clone	R12H16 marker	9020-F4 marker
G 14	-	-
G 16	-	-
G 17	-	-
GAN 66-186	-	-
GAN 79-216	-	-
GAN 95-108	+	+
Ganapathy	+	+
G I1	-	-
GI 13	-	-
GN 95-108	-	-
Goliath	-	-
Green German	-	-
Guangxi 86-05	-	-
Guangxi 87-21	-	-
Guangxi 87-22	-	-
Hatuni	+	+
IM 72-232	+	+
IMP 2886	-	-
IMP 3057	-	-
IMP 9068	-	-
IMP 9089	-	+
IMP 9751	-	-
IN 84-21	-	-
IN 84-68A	-	-
IND 81-144	-	-
IND 81-161	-	-
IND 81-165	-	-
IND 81-80	-	-
IND 82-257A	-	-
IND 82-311	-	-
IS 76-184	-	+
JW 570	-	-
JW 599	-	-
Kalari	+	+
Kalimpong	-	-
Katha	+	+
Kerah73	-	-
Ketari	+	+
Khagzi	+	+

Table 3. Continue

Clone	R12H16 marker	9020-F4 marker
KT730	+	+
LA Purple	-	-
LA Stripe	-	-
Lafitte1	-	-
Lafitte2	-	-
Larose	+	+
Matna Shahj	+	+
Mcikum	+	+
Mentor4745	-	-
Merthi	+	+
MerthiZell	+	+
Miscanthus X Gig	-	-
MOL1032A	-	-
MOL1032B	-	-
Molokai	+	-
MPTH 97-003	-	-
MPTH 97-107	-	+
MPTH 97-113	-	-
MPTH 97-194	-	-
MPTH 97-200	-	-
MPTH 97-204	+	+
MPTH 97-209	-	-
MPTH 97-213	-	-
MPTH 97-216	-	-
MPTH 97-218	-	-
MPTH 97-221	-	-
MPTH 97-233	-	-
MPTH 97-260	-	-
MPTH 97-461	-	-
MPTH 98-283	-	-
MPTH 98-326	-	-
MPTH 98-388	-	-
MPTH 99-476	-	-
Muntok Java	-	-
N 25	+	+
N 32	-	-
N 37	-	-
Nargori	+	+
Newra	+	+

Table 3. Continue

Clone	R12H16 marker	9020-F4 marker
NG 57-054	-	-
NG 77-055	+	+
NG 77-147	+	+
NG 77-159	-	-
NG 77-214	-	-
Oideng	-	-
Panura	+	+
PCANOR 84-2A	-	-
PCAV 84-12A	-	-
PCAV 84-12B	-	-
PCAV 84-12C	-	-
PIN 84-1B	-	-
PQ 84-3	-	+
Q 196	-	-
R 34-P16	-	-
R 65-P67	-	+
Rena	+	+
RheaSport	+	+
Robustus	-	-
Roc09	+	+
Roc20	+	+
Roc22	+	+
Ruckri	+	+
S 66121A	-	-
S 66-84A	-	-
S 66-84B	-	-
S 97-19	-	-
SES 006	-	-
SES 114	-	-
SES 147B	-	-
SES 189	-	-
SES 205A	-	-
SES 231	-	-
SES 234A	-	-
SES 234B	-	-
SES 288	-	-
SES 323A	-	-
SES 84-58	-	-
SH 249	-	-

Table 3. Continue

Clone	R12H16 marker	9020-F4 marker
SilverGrass	-	-
SP 91-3440	-	-
Spont 17	-	-
Spont 24	-	-
Spont 37	-	-
Tainan	-	+
Tekcha Okinawa	+	+
Tereru	+	+
Tukuya1	+	+
TUS 05-02	-	-
TUS 05-08	-	-
TUS 05-16	-	-
Uba India	+	+
Uba Naquin	+	+
Ubadel Natal	+	+
US 56-13-7	-	-
US 56-15-8	-	-
US 57-60-2	-	-
US 67-22-2	-	-
VCP 97-127	-	-
Vellai	-	-
Veremis	-	-
Yellow Cal.	-	-
Yun 81-173	+	+
Zwinga	+	+